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ABSTRACT

In 1993, the California Community Colleges' Commission on Innovation published recommendations for the colleges to accommodate more students, respond to growing student diversity, and provide students with more advanced education and skills for the future. Included in the report are estimates of cost and savings for implementation. Focusing on these figures, this document provides the detailed technical and cost assumptions that provided the bases for the Commission's estimates. Section I explains the assumptions and costs associated with the following investment initiatives recommended by the Commission: (1) instructional and student services innovation grants; (2) faculty development programs; (3) faculty development centers; (4) assessment system pilots; (5) data capabilities enhancement; (6) grants for demonstrating more efficient management practices; (7) high performance reward program; (8) funding an Institute for Technology and Distance Education; (9) multimedia grants; (10) High Technology Centers demonstration grants; (11) strengthening the Chancellor's Office capabilities; and (12) instructional innovation planning grants. This section also describes the terms of recommended technology bonds. Section II focuses on the Commission's technology recommendations, including distance education, new learning technologies, and the formation of high technology centers. Section III discusses the models that generated the Commission's estimates of facilities-related savings resulting from distance education, afternoon scheduling, and year-round operations. Finally, section IV focuses on estimates of savings resulting from more efficient management practices adopted from the "quality movement." Data tables are included throughout. Contains 410 references. (KP)

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Technical and Cost Assumptions for the Implementation of the Commission on Innovation's Action Agenda

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TECHNICAL AND COST ASSUMPTIONS FOR THE IMPLEMENTATION OF THE COMMISSION ON INNOVATION'S ACTION AGENDA

Commission on Innovation

January 1994

Staff: BW Associates
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PREFACE

The California Community Colleges Board of Governors formed the Commission on Innovation in November 1991 to recommend ways in which the colleges could accommodate at least a third more students, respond to growing student diversity, and provide all students with the more advanced education and skills they will need in the 21st century, without relying on more funding either from fee increases or additional state allocations.

The Commission's report—*Choosing the Future: An Action Agenda for Community Colleges*—was delivered to the Board of Governors on October 27, 1993. The report recommends 13 specific strategies and 73 action steps that could be taken by the colleges, the Board, the Legislature and others in order to meet the challenges faced by the community colleges in the years ahead.

Choosing the Future provides summary estimates of the costs that could be incurred and the savings that could be realized if Commission recommendations were implemented. This document presents the detailed technical and cost assumptions that provide the bases for these estimates.

INTRODUCTION

In *Choosing the Future*, the Commission estimates that if the community colleges continue to operate as they now do—that is, maintaining both expenditures per student and facilities costs for additional students at current levels—it would cost approximately $4.8 billion per year by 2005 (in 1991 constant dollars, including state, local, federal, and debt retirement funds) to accommodate all enrollment demand. The Commission estimates that 1994 total expenditures (in 1991 constant dollars) would be some $3.6 billion; thus, continuing "business as usual" would result in a one-third increase in total costs over the period from 1994 to 2005—with no assurance of increased effectiveness. The most likely outcome—given the state's fiscal crisis—is that thousands of students would be turned away and many others would not obtain the higher level of education and training they need in order to succeed in tomorrow's economy.

The strategies and action steps recommended by the Commission address this crisis head-on. They could allow the colleges to accommodate enrollment growth *without* significant increases in expenditures, while greatly strengthening educational effectiveness. The Commission estimates that the implementation of its recommended innovations could yield gross savings of some $1.2 billion per year by 2005.

In order to achieve these savings and effectiveness improvements, the Commission recommends that the State and the community colleges create an *Investment Fund for Innovation* based primarily on a set-aside from the State's general purpose support for the colleges, and issue State general obligation *Technology Bonds* to finance the acquisition of instructional, management, and telecommunication technologies. The Commission estimates that the Investment Fund for Innovation should be spending some $82 million per year by 2005 and that the retirement cost of technology bonds should by then come to about $214 million per year. Together, the Investment Fund and technology bonds represent a total estimated investment of $296 million per year by 2005. Estimated net savings would thus be $886 million per year by 2005, so that enrollment demand could be met and enhanced effectiveness achieved for an increase in costs of only nine percent over 1994 levels.

Table 1 presents an overview of these Commission estimates; it shows estimated savings and recommended investments for each year from 1994 to 2005. This table is an expanded version of Table 2 on page 108 in *Choosing the Future*.

The balance of this document provides the detailed cost models underlying these estimates and discusses the assumptions made by the Commission in developing these models. The models were developed by Commission staff in consultation with experts within and outside of the community college system. Each represents one plausible scenario—out of myriad possibilities—of how investment funds could be allocated or savings achieved. Though the models are fallible and should not be taken as precise predictors, we believe that they provide reasonable approximations to support the proposition that the community colleges can serve significantly higher numbers of students within their current funding levels.

Table 1

Estimated Savings

(Millions of 1991 Constant $s)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Expenditures Assuming Business As Usual	**$3,594**	**$3,653**	**$3,678**	**$3,727**	**$3,771**	**$3,818**	**$3,882**	**$3,991**	**$4,197**	**$4,455**	**$4,680**	**$4,824**
A. Savings From Recommended Strategies												
1. Savings from Telecourses	$0	$42	$84	$126	$169	$211	$232	$255	$280	$307	$333	$357
2. Savings from Afternoon Scheduling	$0	$2	$4	$6	$7	$9	$11	$13	$15	$17	$18	$20
3. Savings from Year-round Operations	$0	$1	$1	$2	$3	$3	$4	$5	$5	$6	$7	$7
4. Savings from Technology Centers	$0	$0	$13	$50	$94	$128	$195	$241	$285	$359	$401	$455
5. Savings from New Learning Technologies	$0	$30	$59	$87	$115	$139	$139	$139	$139	$139	$139	$139
6. Savings from More Efficient Management	$0	$17	$33	$50	$67	$83	$101	$120	$144	$171	$199	$204
Total Gross Savings	**$0**	**$92**	**$194**	**$321**	**$455**	**$574**	**$683**	**$773**	**$868**	**$998**	**$1,097**	**$1,182**
B. Investments Needed to Realize Savings & Enhance Effectiveness												
Investment Fund for Innovation	$9	$25	$51	$65	$83	$84	$84	$84	$84	$82	$82	$82
Technology Bond Retirement	$14	$35	$58	$79	$109	$123	$135	$159	$177	$198	$203	$214
Total Investment Costs	**$23**	**$60**	**$109**	**$144**	**$192**	**$207**	**$220**	**$243**	**$261**	**$280**	**$285**	**$296**
Net savings	**($23)**	**$31**	**$85**	**$177**	**$263**	**$367**	**$463**	**$529**	**$607**	**$718**	**$811**	**$886**
Expenditures with Recommendations	**$3,617**	**$3,621**	**$3,592**	**$3,550**	**$3,508**	**$3,451**	**$3,419**	**$3,461**	**$3,590**	**$3,737**	**$3,869**	**$3,938**

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Organization of this Document

This document is divided into four sections. Section I explains the assumptions and costs associated with the **investments** recommended by the Commission—the Investment Fund for Innovation and Technology Bonds. Many of these recommended investments are closely linked to Commission strategies for saving money by improving college productivity and efficiency. Other investments are recommended, not as a way of saving money, but in order to improve educational effectiveness. And some investments would lead to *both* improved productivity *and* enhanced effectiveness. For the sake of clarity, all investment costs are first discussed in Section I.

Section II discusses in detail the models used to estimate the cost and savings resulting from the three major **technology** strategies recommended by the Commission—distance education, new learning technologies, and technology centers.

Section III discusses the models that generated the Commission's estimates of **facilities**-related savings resulting from distance education, afternoon scheduling, and year-round operations.

Section IV discusses estimates of savings resulting from **more efficient management practices.**

References in parentheses throughout the document are to *Choosing the Future*.

I. INVESTMENT COSTS

Investment Fund for Innovation (Recommendation I, Strategy 1, Action 1, page 27)

The Investment Fund for Innovation would support 12 key initiatives recommended by the Commission. Table 2a displays the year-by-year costs the Commission estimates would be associated with each of these initiatives; the yearly totals are the same as those shown for the Investment Fund in Table 1, above. Each of the 12 recommended initiatives is described briefly below, together with an explanation of relevant cost assumptions.

Instructional and Student Services Innovation Grants (Recommendation I, Strategy 2, Action 1, page 32). The Commission envisions this grants program as a major effort to focus on developing models for active learning and other alternative instructional approaches. The awards, averaging $200,000 each, would permit sustained work by faculty teams on advanced active learning techniques. The Commission's estimates assume a scenario in which five grants are awarded in 1994, 15 in 1995, and 25 are awarded each year thereafter until 2005.

Faculty Development Programs (Recommendation I, Strategy 2, Action 2.2, page 33; Recommendation III, Strategy 2, Action 3.5, page 85). This initiative is aimed at supporting faculty who need to develop expertise in alternative instructional approaches and the uses of technology-assisted learning. The estimates assume that two-thirds of all full- and part-time faculty are trained in advanced teaching/learning techniques by 2005 through 30 days of release time provided to two-thirds of all faculty by that year. To assure estimates that provide adequate room for salary increases and unanticipated costs, the Commission assumes that all faculty—full- and part-time—earned salaries and benefits totaling $55,000 a year and that consultants, travel, supplies, and other materials would add 50 percent to the costs of the release time. The Commission assumes a scenario in which funding is gradually increased until it reaches maximum levels in the fifth year of the program (1998), and stays at that level through 2002 in order to provide support to 47 percent of all faculty by that date. The remaining 20 percent of faculty to be trained by 2005 would then be able to be supported at slightly lower levels of funding from 2003-2005.

Faculty Development Centers (Recommendation I, Strategy 2, Action 2.3, page 33; Recommendation III, Strategy 2, Action 3.6, page 86). These funds would pay for the establishment of up to 12 centers at community college campuses. The centers would help to develop faculty expertise in active learning techniques and technology use. Funds would be awarded to campuses on the basis of a competitive RFP process. The Commission's estimates assume that each of 12 sites would be staffed by three full-time faculty at $55,000 each, for a total cost of $1.98 million per year, starting in 1995.

Pilots of Assessments System (Recommendation I, Strategy 4, Action 3, page 41). This initiative would support the cost of developing and piloting assessment instruments as well as the initial implementation of a system of assessments. Estimating these costs is difficult, as the costs would

Table 2

Investment Costs

(Millions of 1991 Constant $s)

Table 2A. Investment Fund for Innovation

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Instructional and Student Services Innovation Grants	$1.00	$3.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00
Faculty Development Programs	$1.00	$10.13	$22.50	$33.75	$49.50	$49.50	$49.50	$49.50	$49.50	$45.00	$45.00	$45.00
Faculty Development Centers	$0.00	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98	$1.98
Pilots of Assessments System	$0.50	$2.00	$6.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00
Enhancement of College Data Capabilities	$0.50	$0.50	$6.00	$8.00	$10.00	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00	$12.00
Grants for Demonstrating More Efficient Management Practices	$0.75	$0.75	$0.75	$0.75	$0.75	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
High Performance Reward Program	$0.00	$0.00	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50
Funding of INTECH	$0.50	$0.50	$0.50	$3.00	$3.00	$3.00	$3.00	$3.00	$3.00	$5.00	$5.00	$5.00
Grants to Implement Multimedia, ILS Systems	$0.55	$0.55	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10	$1.10
Demonstration Grants for High Tech. Centers	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66	$0.66
Strengthening of Chancellor's Office Capabilities	$0.55	$1.10	$1.65	$2.20	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75	$2.75
Planning Grants for Afternoon Scheduling, Year-round Operations, Master Course Scheduling	$3.00	$4.00	$4.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Fund for Innovation Sub-Total	**$9.01**	**$25.17**	**$50.64**	**$64.94**	**$83.24**	**$84.49**	**$84.49**	**$84.49**	**$84.49**	**$81.99**	**$81.99**	**$81.99**

Table 2B. Technology Bond Retirement

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Telecourse Equipment	$0.00	$0.51	$1.02	$1.53	$2.04	$2.56	$2.58	$2.63	$2.75	$2.91	$3.05	$3.13
Basic Skills ILS Equipment	$0.87	$1.75	$2.62	$3.50	$4.37	$4.37	$4.37	$4.37	$4.37	$4.37	$4.37	$4.37
ESL Systems Equipment	$0.59	$1.19	$1.78	$2.38	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97
Vocational Systems Equipment	$8.55	$17.11	$25.66	$34.21	$42.77	$42.77	$42.77	$42.77	$42.77	$42.77	$42.77	$42.77
Technology Centers Facilities & Equipment	$3.91	$14.57	$27.31	$37.06	$56.60	$69.85	$82.62	$105.95	$123.98	$144.86	$150.22	$160.95
Bond Retirement Sub-Total	**$13.93**	**$35.13**	**$58.39**	**$78.68**	**$108.75**	**$122.52**	**$135.31**	**$158.69**	**$176.85**	**$197.88**	**$203.38**	**$214.19**

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vary widely depending on the specific strategies used. The Commission's estimates would provide $500,000 in 1994 and $2 million in 1995 as the effort is launched, and $8 million per year beginning in 1997 for initial implementation.

Enhancement of College Data Capabilities (Recommendation II, Strategy 2, Action 3, page 56; Recommendation III, Strategy 2, Action 4, page 87). The Commission recommends that the colleges develop a comprehensive information network, link college data systems to labor market and employment data, and strengthen their student and management information systems. These costs also are difficult to estimate and depend on the current data processing capabilities at each campus, specific strategies used, and the ever-changing cost of hardware and software. The Commission recommends that five college pilot sites be funded to develop enhanced data capabilities. Budget estimates include $500,000 in each of the first two years to perform needs assessments and strategic planning, increasing sharply in later years $6 to $12 million per year to finance substantial hardware, software, and development costs.

Grants for Demonstrating More Efficient Management Practices (Recommendation III, Strategy 1, Action 2, page 71). The Commission assumes that funds would be provided for five demonstration grants of $150,000 each, for five years beginning in 1994. The grants would be awarded to colleges on a competitive basis to demonstrate and implement quality improvement practices. Dissemination of findings to other colleges would be a responsibility and requirement for the award of a grant.

High Performance Reward Program (Recommendation III, Strategy 1, Action 4, page 72). This program would be modeled after the noted Baldridge National Quality Awards program of the U.S. Department of Commerce. Starting in 1996, the program would provide cash awards of $50,000 each to up to ten colleges per year judged to have achieved significant efficiency gains.

Funding of INTECH (Recommendation III, Strategy 2, Action 1.3, page 77). An Institute for Technology and Distance Education would be chartered as an independent, system-level organization to plan, oversee, and coordinate the development of a pervasive technological infrastructure at the community colleges. The Commission's estimates assume that $500,000 is provided for each of the first three years of INTECH operations, $3 million per year for the next five years, and $5 million per year thereafter.

Grants to Implement Multimedia, ILS Systems (Recommendation III, Strategy 2, Action 3.2, page 84). These funds would provide a continuing source of grants to colleges to build their capacity to implement multi-media, interactive approaches to basic skills, ESL, and core vocational instruction. The size and timing of the grants would be decided by INTECH in consultation with the field. The Commission's estimates provide $550,000 per year in 1994 and 1995 on the assumption that 20 faculty members are funded to devote half of their time to addressing implementation issues. Funding would double in 1996 and thereafter to provide half-time funding for 40 faculty members per year.

Demonstration Grants for High Tech Centers (Recommendation III, Strategy 2, Action 3.3, page 84). These funds would be awarded by INTECH in the form of demonstration grants for colleges to develop models of High Technology Centers for technology-assisted learning. The Commission's estimates assume that five-year grants of $110,000 each will be provided to six colleges per year, beginning in 1994.

Strengthening of Chancellor's Office Capabilities (Recommendation III, Strategy 3, Action 5, page 93). The Commission recommends strengthening the Chancellor's Office to enable it to assume new and enlarged responsibilities. The Commission's estimates assume that funding would be phased in to eventually provide 35 additional staff at an average of $70,000 each for salaries, benefits, and support costs, and that $300,000 per year would pay for additional data processing capabilities.

Planning Grants for Afternoon Instruction, Year-round Operations, Master Course Scheduling (Recommendation III, Strategy 4, Actions 3-5, pages 98-101). Commission estimates provide for grants of $100,000 each to be awarded to colleges to support planning for afternoon scheduling, year-round operations, and master course scheduling. The funding shown in Table 2 would fund 30 colleges in 1994 and 40 colleges each in 1995 and 1996.

The total annual cost of the Innovation Fund would reach $82 million in 2005, as shown in Table 2a.

Technology Bonds (Recommendation III, Strategy 2 , Action 3.1, page 83)

The Commission recommends that general obligation bonds be used to finance the acquisition of technology-based learning systems (hardware and specialized software) and the construction of specialized facilities. The models discussed throughout the next section calculate net savings from technology use after taking into account the cost of retiring the bonds that would be needed to finance this technology acquisition. Table 2b, above, summarizes these bond retirement costs. The table displays the annual cost from 1994-2005 of amortizing five-year technology bonds at 6 percent annual interest, together with 20-year bonds to finance the cost of building specialized facilities, also at 6 percent interest. The debt retirement costs shown in the table reach $214 million per year by 2005. The technology bonds are amortized on a five-year schedule on the assumption that wear and obsolescence will require technology-based learning systems to be replaced every five years.

II. TECHNOLOGY RECOMMENDATIONS

The Commission has recommended the adoption of three major technology-based strategies to enhance the community colleges' capability to serve increased numbers of students at higher levels of effectiveness, without spending more money. This section discusses the Commission's estimates of the operational cost savings resulting from the implementation of these strategies.

Distance Education (Recommendation III, Strategy 2, Action 2, pages 78-82)

Distance education strategies can take a broad variety of forms ranging from simple print or cassette tape versions of course materials distributed to students, to highly sophisticated interactive video classes where students and instructor gather at sites equipped with audio and video reproduction and transmission equipment and are linked by high-speed fiber optic networks.

To explore the feasibility of distance education strategies, Commission staff convened discussion groups of community college and other distance education experts and reviewed relevant research. Staff constructed detailed models and analyses of various ways of implementing distance education. The initial findings from these efforts are documented in *The Feasibility of Statewide Distance Education,* the fifth in a series of six discussion papers prepared for the Commission on various topics.[1]

One potential advantage of distance education is a reduction in instructional costs resulting from shifting the role of instructional staff from a relatively low productivity role of lecturer/teacher to a more productive role as "learning coach" or facilitator. Distance education can facilitate this by capturing the lecture, demonstration, and other portions of courses and reproducing and distributing them much more efficiently than conventional methods.

The Commission recommends that the community colleges serve 20 percent of all enrollment demand via distance education by 2005. This recommendation does not assume that one out of five FTES would take all courses entirely in a distance mode; rather, any given student might take one out of five courses via distance technologies, or students might use distance means in one out of five class sections. The Commission's distance education strategy would reach traditional and non-traditional students in a more cost-effective fashion than conventional classes, yet maintain a relatively high level of contact between the students and instructional staff. Such a strategy could lead to savings of between $500 and $550 per FTES when compared with conventional instructional strategies, plus facilities savings (discussed in Section III, below). Models developed by the Commission, described below, show that annual savings could reach $135 million by 2005, even if colleges are allowed to retain half of the savings as an incentive to significantly expand their current distance education efforts.

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[1]Commission on Innovation, *The Feasibility of Statewide Distance Education*, Policy Discussion Paper #5, September 1992. Berkeley, CA: BW Associates, WP-114, 1992.

Starting with Telecourses. The Commission's estimates assume the use of proven and demonstrated distance education technology whereby students receive televised course material in their homes via cable television. To ensure that this telecourse strategy results in high-quality instruction, the Commission's estimates include funding for significant levels of faculty involvement and interaction with students during face-to-face meetings that supplement the telecourse broadcast material.

Table 3 shows these estimates in detail, based on the specific assumptions listed below and varying the number of students in each course from 50 to 10,000. Due to the high assumed "up front" costs, the estimated cost to serve each FTES is very high ($10,286) for telecourses with only 50 students. The cost per FTES drops sharply to $2,217 when, as the Commission assumed, 750 students are enrolled in each telecourse. In Table 3 and all subsequent tables in this document, the shaded column indicates the costing assumption made by the Commission in developing its estimates.

The following assumptions underlie the cost estimates shown in Table 3:

- *License costs.* It costs $15,000 per course for the license to broadcast telecourse material. The license fees are compensation to the developer(s) of video course tapes.[2]

- *Per-student fee.* In addition to license costs, a per-student fee of $15 per student is assumed as additional compensation to the course developer(s)—in effect, a royalty.[3]

- *Up-link costs.* The model assumes that it costs $1,154 per hour of instruction to lease satellite time to broadcast the telecourse.[4]

- *Supplies and materials.* The model assumes $7 per student to provide supplies and materials.[5]

- *Hourly cost of staff.* The model assumes that full-time instructors cost $45 per hour, based on an average salary and benefits package of $55,000, divided by a 36 week work year, divided by a 35 hour work week. The model assumes that teaching assistants cost $13 per hour.[6]

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[2]This figure is based on focus group discussions and follow-up interviews with administrators of current telecourse operations in California.

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]California Community Colleges, Chancellor's Office, Research and Analysis Unit, *Report on Staffing and Salaries Fall 1991.* Sacramento, CA: July 1992. According to the report, the mean salary for full-time community college faculty was $48,976 in 1991.

Table 3

Estimated Cost/FTES of Providing Instruction via Telecourses

# Students per Course	50	200	500	750	1500	5000	7500	10000
Licence per Course	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
Fee per student per Course	$15	$15	$15	$15	$15	$15	$15	$15
Uplink Cost /hour of instruction	$1,154	$1,154	$1,154	$1,154	$1,154	$1,154	$1,154	$1,154
Supplies & Materials Cost per student per Course	$7	$7	$7	$7	$7	$7	$7	$7
Cost per hour for FT Instructor	$45	$45	$45	$45	$45	$45	$45	$45
Cost per hour for teaching Assistant	$13	$13	$13	$13	$13	$13	$13	$13
# Hours of Instruction per Course	16	16	16	16	16	16	16	16
# Courses per Semester	10	10	10	10	10	10	10	10
# Semesters per Year	3	3	3	3	3	3	3	3
Instructor Grading Hours per student per Course	3	3	3	3	3	3	3	3
Instructor Prep Hours per Course	16	16	16	16	16	16	16	16
Instructor Q&A Hours per student per Course	1	1	1	1	1	1	1	1
Max Instructor Hours per week	35	35	35	35	35	35	35	35
# Weeks per Year	48	48	48	48	48	48	48	48
# Units per Course	3	3	3	3	3	3	3	3
FTE credit equivalent per Year	30	30	30	30	30	30	30	30
Total Hours of Instruction	480	480	480	480	480	480	480	480
Total Students per Year	1,500	6,000	15,000	22,500	45,000	150,000	225,000	300,000
Total grading Hours per Course	150	600	1,500	2,250	4,500	15,000	22,500	30,000
Total Q&A Hours per Course	50	200	500	750	1,500	5,000	7,500	10,000
Total prep Hours per Course	16	16	16	16	16	16	16	16
Total Hours per Course	216	816	2,016	3,016	6,016	20,016	30,016	40,016
Total Hours per Course per week	14	51	126	189	376	1,251	1,876	2,501
Total Instructor Hours per Course per week	14	35	35	35	35	35	35	35
TA Hours per Course	0	16	91	154	341	1,216	1,841	2,466
Total Instructor Hours per Year	6,480	16,800	16,800	16,800	16,800	16,800	16,800	16,800
Total TA Hours per Year	0	7,680	43,680	73,680	163,680	583,680	883,680	1,183,680

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Table 3 (Cont.)

# Students per Course	50	200	500	750	1500	5000	7500	10000
Total Units per Year	4,500	18,000	45,000	67,500	135,000	450,000	675,000	900,000
FTE Equivalent	150	600	1,500	2,250	4,500	15,000	22,500	30,000
Licence Costs per Year	$450,000	$450,000	$450,000	$450,000	$450,000	$450,000	$450,000	$450,000
Total Instructor Costs	$291,600	$756,000	$756,000	$756,000	$756,000	$756,000	$756,000	$756,000
Total TA Costs	$0	$99,840	$567,840	$957,840	$2,127,840	$7,587,840	$11,487,840	$15,387,840
Non-Instructional Costs (54.1% of Instructional)	$157,756	$463,009	$716,197	$927,187	$1,560,157	$4,514,017	$6,623,917	$8,733,817
Total Uplink Costs	$553,920	$553,920	$553,920	$553,920	$553,920	$553,920	$553,920	$553,920
Student FEE per Year	$22,500	$90,000	$225,000	$337,500	$675,000	$2,250,000	$3,375,000	$4,500,000
Supplies Cost per Year	$10,050	$40,200	$100,500	$150,750	$301,500	$1,005,000	$1,507,500	$2,010,000
TV/VCR Costs amortized @ 6% for 5 Years	$1,929	$7,286	$18,000	$26,929	$53,714	$178,714	$268,000	$357,286
Cost for Extra Meetings	$40,500	$162,000	$405,000	$607,500	$1,215,000	$4,050,000	$6,075,000	$8,100,000
Cost of Cable Subsidy for 10% of Students	$16,500	$66,000	$165,000	$247,500	$495,000	$1,650,000	$2,475,000	$3,300,000
Total Cost w Equipment	$1,544,754	$2,688,255	$3,957,457	$5,015,126	$8,188,132	$22,995,492	$33,572,177	$44,148,863
Total Cost w/o Equipment	$1,542,826	$2,680,969	$3,939,457	$4,968,197	$8,134,417	$22,816,777	$33,304,177	$43,791,577
Cost/FTES w/o Equipment	$10,286	$4,468	$2,626	$2,217	$1,808	$1,521	$1,480	$1,460
Estimated Cost/FTES for Current System	$3,296	$3,296	$3,296	$3,296	$3,296	$3,296	$3,296	$3,296
Cost/FTES w/o Equipment If Savings Split with	$10,286	$4,468	$2,961	$2,756	$2,552	$2,409	$2,388	$2,378

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- *Course structure*. The model assumes that 16 hours of material are broadcast for each course, 10 courses are offered during each of three semesters on a year-round calendar, and each course is worth 3 credit units. The table shows the resulting numbers of students served, FTES, and units offered. The number of students in each course varies from 50 to 10,000 across the columns of the table.[7]

- *Instructor time*. Three hours of instructor time per student to grade exams, 16 hours for preparation (one hour for each hour of broadcast time) and 1 hour per student for one-on-one questions and answer time are assumed in the model. The model also assumes that full-time instructors perform the first 35 hours per week, per course, of instructional tasks, and that teaching assistants perform the remaining instructional tasks.

In addition, the table shows an added non-instructional cost component of 54 percent of instructor costs, on the assumption that telecourses will require substantial non-instructional costs to support the programs.[8] Television and videocassette recorder costs are also included to supply each FTE staff member with such equipment. The model assumes that this equipment will cost $500 per FTE and is financed through technology bonds over a 5 year period at six percent interest. Table 3 also shows that operating a telecourse enrolling 750 students would cost an estimated 2,217 per FTES, a significant savings when compared with the per-FTES cost of the current system.

Based on discussions with experienced telecourse practitioners, the Commission also recommends that significant face-to-face meeting time between students and instructors be a part of a telecourse strategy to ensure high-quality instruction. As shown in Table 4, it is estimated that the cost of offering such contact would be $270 per FTES based on the assumptions listed below:

- Three meetings per course lasting four hours each, staffed by a full time instructor.[9]

- No more than 50 students attend each meeting, to ensure some personal degree of contact. A 750 student telecourse, for example, would require that the class be divided into 15 sections of 50 students, during each of the 3 meetings, to ensure such contact.

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[7]The 16 hours of telecourse time, when combined with the 12 hours of face-to-face meeting time described below, yield 28 hours of instruction-related time. Though this is less than the 45 hours of instruction-related time in a class that meets 3 hours per week for 15 weeks per semester, practitioner experience shows that there is no learning decrement if the course materials are of high quality.

[8]California Community Colleges, Chancellor's Office, *1991-92 Fiscal Data Abstract*. Sacramento, CA: 1992. The Abstract shows that non-instructional costs were 88 percent of instructional costs in 1991-92 and that of the 88 percent, 28 percent are facilities and maintenance related. The 54 percent figure assumes that distance education does not generate facilities and maintenance costs (88 percent minus 28 percent equals 60 percent) and that the 60 percent figure is reduced by 10 percent due to management efficiencies (discussed below in Section IV), which yields 54 percent.

[9]Distance education focus group members suggested that one meeting at the beginning of the course and one each before midterm and final exams would add significantly to the quality of the course.

Table 4

Estimated Cost/FTES of Extra Meetings and Providing Cable Subsidy for Instruction via Telecourses

Extra Meetings								
# Students per Course	**50**	**200**	**500**	**750**	**1,500**	**5,000**	**7,500**	**10,000**
# Students required for a Site Meeting	50	50	50	50	50	50	50	50
# Meetings per Semester per Course	3	3	3	3	3	3	3	3
# Prep Hours per Site Meeting	6	6	6	6	6	6	6	6
# Contact Hours per Site Meeting	4	4	4	4	4	4	4	4
Cost per hour for Instructor	45	45	45	45	45	45	45	45
# Sites per Meeting per Course	1	4	10	15	30	100	150	200
# Site Meetings per Course	3	12	30	45	90	300	450	600
# Prep Hours per Site Meeting per Course	18	72	180	270	540	1,800	2,700	3,600
# Contact Hours per Site Meeting per Course	12	48	120	180	360	1,200	1,800	2,400
Total Hours per Site Meeting per Course	30	120	300	450	900	3,000	4,500	6,000
Instructor Cost for Site Meetings per Course	$1,350	$5,400	$13,500	$20,250	$40,500	$135,000	$202,500	$270,000
Instructor Cost for Site Meetings per Semester	$13,500	$54,000	$135,000	$202,500	$405,000	$1,350,000	$2,025,000	$2,700,000
Instructor Cost for Site Meetings per Year	$40,500	$162,000	$405,000	$607,500	$1,215,000	$4,050,000	$6,075,000	$8,100,000
Additional Cost per FTE	**$270**	**$270**	**$270**	**$270**	**$270**	**$270**	**$270**	**$270**

Cable Subsidy								
# Students per Course	**50**	**200**	**500**	**750**	**1,500**	**5,000**	**7,500**	**10,000**
# of Students per Course who need cable subsidy @10	5	20	50	75	150	500	750	1,000
Cost per student ($30 installation, $20 pm for 4 months)	$110	$110	$110	$110	$110	$110	$110	$110
Cost per Course per Semester	$550	$2,200	$5,500	$8,250	$16,500	$55,000	$82,500	$110,000
Cost per Semester	$5,500	$22,000	$55,000	$82,500	$165,000	$550,000	$825,000	$1,100,000
Cost per Year	$16,500	$66,000	$165,000	$247,500	$495,000	$1,650,000	$2,475,000	$3,300,000
Additional Cost per FTE	**$110**	**$110**	**$110**	**$110**	**$110**	**$110**	**$110**	**$110**

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- These meetings are in addition to the one hour per student of question and answer time built into the basic telecourse model.

Finally, the Commission recommends that funds be provided to subsidize cable television subscriptions for students who cannot afford this cost. The model assumes that 10 percent of students receive subsidies of $110 each ($30 to cover installation costs and $20 per month for four month to pay basic subscription charges).[10] Table 4 shows the cost increases associated with extra meeting time and cable television subsidies.

Table 5 shows the Commission estimate that implementing a telecourse distance education strategy could save $134 million per year by 2005 under the following assumptions:

- Telecourses serve 20 percent of FTES enrolled in for-credit courses by the year 2004.
- The goal of serving 20 percent of all credit FTES is reached over a five-year phase in period starting in 1995, to allow planning time and permit an orderly, gradual implementation.
- Each telecourse enrolls 750 students.
- The current cost of serving each for-credit FTES is $3,296.[11]
- The cost of serving each FTES via a 750 student telecourse is $2,217.
- The $1,080 per-FTES estimated savings ($3,296-$2,217) generated by the telecourse strategy is "split" between the State and the community college ($540 each) to give the colleges a fiscal incentive to offer telecourses.

Technology-based Approaches to Instruction (Recommendation III, Strategy 2, Actions 3.2. and 3.3, page 84)

In addition to the distance education/telecourse strategy outlined above, the Commission recommends the adoption of two major technology-based approaches to delivering instruction. The first is to employ new learning technologies that use desktop computers and advanced multi-media, interactive courseware to provide instruction to students in basic skills, English as a second language (ESL), and core vocational courses. The second approach would employ similar technology in large High Technology Centers with 100 or more workstations. The Centers would provide a range of technology-based instruction, from sophisticated systems that would largely

[10]It is not known how many community college students are already cable television subscribers. Cable subscription costs would likely be offset to some degree by students' savings resulting from reduced transportation costs to attend classes at campuses.

[11]In 1991, the per-FTES cost for non-credit courses was $1,648; for credit courses the cost was $3,296.

Table 5

Estimated Annual Operational Savings from Instruction via Telecourses

(Millions of 1991 Constant $s)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
FTES Demand	1,103,825	1,109,449	1,105,838	1,109,816	1,112,052	1,115,327	1,123,822	1,146,551	1,199,758	1,269,487	1,328,624	1,362,209
# FTES served by Telecourses	0	40,740	81,215	122,261	163,343	204,780	206,339	210,512	220,282	233,084	243,942	250,108
Investment Cost/yr.	$0.00	$0.51	$1.02	$1.53	$2.04	$2.56	$2.58	$2.63	$2.75	$2.91	$3.05	$3.13
Amortized Cost/yr.	$0.00	$0.12	$0.24	$0.36	$0.48	$0.60	$0.61	$0.62	$0.65	$0.69	$0.72	$0.74
Total Operational Savings/yr.	**$0.00**	**$21.98**	**$43.82**	**$65.96**	**$88.13**	**$110.48**	**$111.32**	**$113.57**	**$118.84**	**$125.75**	**$131.61**	**$134.94**
Total Operational Savings/yr. – Amortized Investment Costs	**$0.00**	**$21.86**	**$43.58**	**$65.60**	**$87.64**	**$109.88**	**$110.71**	**$112.95**	**$118.19**	**$125.06**	**$130.89**	**$134.20**

replace many existing courses, to less costly supplementary systems that would enable faculty to teach larger numbers of students. The discussion immediately below focuses on the use of advanced technology for basic skills, ESL, and core vocational instruction. We then discuss the use of these and related technologies in the context of High Technology Centers.

Integrated Learning Systems (ILS) for basic skills. Integrated learning systems typically use desktop computers with color monitors to deliver sophisticated instructional programs that are stored on high-density media. Such media include compact disk memory systems widely used in home music reproduction and laser discs which are often used to store feature-length motion pictures. Desktop stations are often linked in a small network by a file server computer. The file server can access a "jukebox" of courseware stored in digital form and send it to the linked desktop systems via high-speed network. The server can also monitor students' use of courseware and monitor, record, and store data on students' progress, since many courseware systems have built-in assessment components. Such systems can provide very rich, high time-on-task instruction with modest amounts of faculty oversight and coaching. Since assessment, reporting, and student progress analysis are automated and integrated into these systems, they are called *integrated* learning systems.

Table 6 shows the estimated per-FTES cost of ILS for basic skills instruction using full-time and part-time faculty, respectively. The table shows that the estimated per-FTES cost of ILS-based instruction ranges from $412 to $2,472 when using full-time faculty, and depending on how many hours a student requires to complete a course. The table reaches these estimates under the assumptions listed below:

- A basic skills ILS consists of ten learning stations (each equivalent to 386 chip-based desktop computers with color monitors), connected via a high speed network to a central file server computer with substantial high speed data storage capacity. A ten station ILS with basic skills courseware would cost an estimated $65,000.

- Each system would include: (1) a file server computer with a 486 CPU or Apple equivalent, 300-500 Mb rapid-access storage, a CD-ROM player, tape back-up, control monitor, and printer, at a total cost of $12,000; (2) network hardware and software at a total cost of up to $15,000; (3) 10 learning stations with 386 CPU computers, color monitors, mice, and assorted peripherals at a cost of up to $2,400 per station; and (4) learning and instructional management software at a cost of up to $15,000.[12]

- A ten station ILS and courseware costing $65,000 costs $15,340 per year when amortized over five years at a 6 percent interest rate. With an estimated annual maintenance cost of $10,000, the total annual hardware, courseware, and maintenance cost for the ten station system would be $25,340.

[12]Since this estimate was prepared, the cost of much of this equipment has continued to drop precipitously, and 386-based machines are nearly obsolete. Thus, the $65,000 estimate is probably conservative.

Table 6

Estimated Cost/FTES of Providing Basic Skills Instruction via Integrated Learning Systems

Student System Hours to Complete Course	10	20	30	40	50	60
Students Served in a year by 10 Systems	1,752	876	584	438	350	292
Amortized Equipment Cost (10 Systems)	$15,340	$15,340	$15,340	$15,340	$15,340	$15,340
Equipment Maintanence & Systems Adminstration (10 Systems)	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000
FTES Supported by 10 Systems	175.20	87.60	58.40	43.80	35.04	29.20

Costs Using Full-Time Faculty for Credit Courses

Faculty Hours for 10 Systems	438	438	438	438	438	438
Faculty Cost	$19,710	$19,710	$19,710	$19,710	$19,710	$19,710
Support Staff Cost @88% of Faculty Costs	$17,479	$17,479	$17,479	$17,479	$17,479	$17,479
Total Cost per Year	$87,529	$87,529	$87,529	$87,529	$87,529	$87,529
Cost/FTES w Equipment Amortized	$499.59	$999.19	$1,498.78	$1,998.37	$2,497.96	$2,997.56
Cost/FTEs w/o Equipment Amortized	$412.04	$824.07	$1,236.11	$1,648.14	$2,060.18	$2,472.22

Costs Using Part-Time Faculty for Non-Credit Courses

Faculty Cost	$8,760	$8,760	$8,760	$8,760	$8,760	$8,760
Support Staff Cost @88% of Faculty Costs	$7,768	$7,768	$7,768	$7,768	$7,768	$7,768
Total Cost per Year	$66,868	$66,868	$66,868	$66,868	$66,868	$66,868
Cost/FTES w Equipment Amortized	$381.67	$763.34	$1,145.01	$1,526.67	$1,908.34	$2,290.01
Cost/FTEs w/o Equipment Amortized	$294.11	$588.22	$882.33	$1,176.45	$1,470.56	$1,764.67

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- ILS are open and available to students 25 percent of the time and provide instruction for 80 percent of the time while the systems are available to students. This yields 17,520 hours of instruction per year from a ten station ILS (8760 hours/year, multiplied by 25 percent, multiplied by 80 percent).[13]

- It takes students from 10 to 60 hours "on the system" to complete the course.[14]

- Each student served by the system during one course is 0.1 FTES, assuming that one FTES is 30 credits and each student earns 3 credits during each course.

- Full-time faculty cost $45 per hour, part-time faculty cost $20 per hour.

- Each system hour a student takes to complete a course requires 1.5 minutes of instructor time to answer questions. Thus, if students need 30 hours on the system to complete one course, the student would require 45 minutes of faculty question and answer time during the course.

- Each 10 station ILS requires a part-time administrator costing $25,000 per year for salary and benefits.

- Support costs run in excess of 88 percent of faculty salary and benefit costs.[15]

Under these assumptions, Table 6 shows that:

- the number of students accommodated by each 10 station system varies directly with the number of hours needed to complete the course;

- faculty, support, and system costs are constant; and

- the resulting per-FTES cost drops significantly with the number of hours students require to complete courses.

For example, if students need 30 hours of ILS time to complete a 3 unit course, it would require 438 hours of faculty time at a cost of $19,710 (3/4 hour per course, multiplied by 584 students equals 438 hours, in turn multiplied by $45 per faculty hour). As the table shows, these

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[13]The 25 percent figure assumes that the systems are open 275 days per year and are operated for eight hours per day during those days. The 80 percent assumption reflects the need to account for maintenance and other down-time. More days and/or hours of system availability would yield increased cost-effectiveness.

[14]Estimating the number of hours needed to complete a course is extremely difficult. Many vendors are actively monitoring and measuring the gains attributable to automated systems, but few statistically significant analyses are available. Anecdotal evidence from private and armed services sector experience suggests substantial gains in learners' retention and understanding, increased consistency of learning, and reductions in the amount of time needed to complete courses of from 36 to 70 percent.

[15]California Community Colleges, op. cit.

faculty costs are constant with respect to the number of hours necessary to complete the course. The total cost to run a ten station system, including purchasing and maintaining the hardware and software ($25,340), hiring a part-time administrator ($25,000), and faculty and support cost ($19,710 plus $17,479) would be $87,529. If students complete the course with 30 hours of system time, 584 students (58.4 FTES) could be served at a cost of $1,499 per FTES, including equipment costs—a significant savings relative to traditional instructional methods.

Interactive, multi-media approaches to ESL and core vocational instruction. The technologies needed for instruction in ESL and core vocational skills present a set of operational assumptions similar to those discussed above for an ILS for basic skills. Technologies for ESL and core vocational instruction would use similar computers and networks, but would cost an estimated $71,000 and $176,000 respectively. ESL systems would include high powered independent multi-media workstations that are not linked via a file server and cost $6,000 each, with software assumed to cost $1,625 per station. Core vocational workstations are estimated to cost $8,000 each for high-powered computers plus necessary high speed CD-ROM storage devices, with courseware costs of $9,600 per station.

Tables 7 and 8 show the estimated cost of implementing technology-based approaches to ESL and core vocational instruction and how costs vary when using full-time versus part-time instructors.

Table 9 shows the Commission's estimates of the annual savings resulting from implementing the technologies discussed above. The table draws from the figures in the previous table, assuming that students require 30 hours of system time to complete each 3 unit course. It shows the number of FTES served by ILS basic skills, ESL, and core vocational systems under the following assumptions:

- Non-ESL basic skills enrollment constitutes 3.82 percent of for-credit FTES and 18.22 percent of non-credit FTES.[16]
- Vocational/technical enrollment constitutes 30 percent of for-credit FTES and 28 percent of non-credit FTES.[17]
- ESL enrollment constitutes 2.35 percent of for-credit FTES and 11.22 percent of non-credit FTES.[18]
- The average per-FTES cost of providing instruction is $3,296 in for-credit courses and $1,648 in non-credit courses.

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[16]Estimates provided by Chancellor's Office staff, personal communication.

[17]Ibid.

[18]Ibid.

Table 7

Estimated Cost/FTES of Providing ESL Instruction via Interactive, Multi-Media Systems

Student System Hours to Complete Course	10	20	30	40	50	60
Students Served in a year by 10 Systems	1,752	876	584	438	350	292
Amortized Equipment Cost (10 Systems)	$16,921	$16,921	$16,921	$16,921	$16,921	$16,921
Equipment Maintanence & Systems Adminstration (10 Systems)	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000
FTES Supported by 10 Systems	175.20	87.60	58.40	43.80	35.04	29.20

Costs Using Full-Time Faculty for Credit Courses

Faculty Hours for 10 Systems	438	438	438	438	438	438
Faculty Cost	$19,710	$19,710	$19,710	$19,710	$19,710	$19,710
Support Staff Cost @88% of Faculty Costs	$17,479	$17,479	$17,479	$17,479	$17,479	$17,479
Total Cost per Year	$89,110	$89,110	$89,110	$89,110	$89,110	$89,110
Cost/FTES w Equipment Amortized	$508.62	$1,017.24	$1,525.85	$2,034.47	$2,543.09	$3,051.71
Cost/FTEs w/o Equipment Amortized	$412.04	$824.07	$1,236.11	$1,648.14	$2,060.18	$2,472.22

Costs Using Part-Time Faculty for Non-Credit Courses

Faculty Hours for 10 Systems	438	438	438	438	438	438
Faculty Cost	$8,760	$8,760	$8,760	$8,760	$8,760	$8,760
Support Staff Cost @88% of Faculty Costs	$7,768	$7,768	$7,768	$7,768	$7,768	$7,768
Total Cost per Year	$68,450	$68,450	$68,450	$68,450	$68,450	$68,450
Cost/FTES w Equipment Amortized	$390.69	$781.39	$1,172.08	$1,562.77	$1,953.47	$2,344.16
Cost/FTEs w/o Equipment Amortized	$294.11	$588.22	$882.33	$1,176.45	$1,470.56	$1,764.67

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Table 8

Estimated Cost/FTES of Providing Interactive, Multi-Media Vocational Instruction

Student System Hours to Complete Course	10	20	30	40	50	60
Students Served in a year by 10 Systems	1,752	876	584	438	350	292
Amortized Equipment Cost (10 Systems)	$41,536	$41,536	$41,536	$41,536	$41,536	$41,536
Equipment Maintanence & Systems Adminstration (10 Systems)	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000
FTES Supported by 10 Systems	175.20	87.60	58.40	43.80	35.04	29.20

Costs Using Full-Time Faculty for Credit Courses

Faculty Hours for 10 Systems	438	438	438	438	438	438
Faculty Cost	$19,710	$19,710	$19,710	$19,710	$19,710	$19,710
Support Staff Cost @88% of Faculty Costs	$17,479	$17,479	$17,479	$17,479	$17,479	$17,479
Total Cost per Year	$113,725	$113,725	$113,725	$113,725	$113,725	$113,725
Cost/FTES w Equipment Amortized	$649.11	$1,298.23	$1,947.34	$2,596.45	$3,245.57	$3,894.68
Cost/FTEs w/o Equipment Amortized	$412.04	$824.07	$1,236.11	$1,648.14	$2,060.18	$2,472.22

Costs Using Part-Time Faculty for Non-Credit Courses

Faculty Hours for 10 Systems	438	438	438	438	438	438
Faculty Cost	$8,760	$8,760	$8,760	$8,760	$8,760	$8,760
Support Staff Cost @88% of Faculty Costs	$7,768	$7,768	$7,768	$7,768	$7,768	$7,768
Total Cost per Year	$93,064	$93,064	$93,064	$93,064	$93,064	$93,064
Cost/FTES w Equipment Amortized	$531.19	$1,062.38	$1,593.57	$2,124.76	$2,655.94	$3,187.13
Cost/FTEs w/o Equipment Amortized	$294.11	$588.22	$882.33	$1,176.45	$1,470.56	$1,764.67

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Table 9

Estimated Annual Savings from New Learning Technologies

(Millions of 1991 Constant $s)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
FTES Demand	1,103,825	1,109,449	1,105,838	1,109,816	1,112,052	1,115,327	1,123,822	1,146,551	1,199,758	1,269,487	1,328,624	1,362,209
FTES Served by New Learning Technologies												
Basic Skills Demand served by ILS	0	3,330	5,666	8,001	10,337	12,672	12,672	12,672	12,672	12,672	12,672	12,672
ESL Demand served by ILS	0	2,050	3,488	4,926	6,363	6,363	6,363	6,363	6,363	6,363	6,363	6,363
Vocational Demand served by Multi-Media Instruction	0	12,026	22,759	33,493	44,227	53,668	53,668	53,668	53,668	53,668	53,668	53,668
Total FTES Served by New Learning Technologies	**0**	**17,406**	**31,913**	**46,420**	**60,927**	**72,704**	**72,704**	**72,704**	**72,704**	**72,704**	**72,704**	**72,704**
Number of Workstations												
Cumulative # Basic Skills ILS workstations	0	57	114	171	228	285	285	285	285	285	285	285
Cumulative # of ESL workstations	0	35	70	106	141	177	177	177	177	177	177	177
Cumulative # of Vocational workstations	0	206	413	619	826	1,032	1,032	1,032	1,032	1,032	1,032	1,032
Total Number of Workstations	**0**	**298**	**597**	**896**	**1,195**	**1,493**	**1,493**	**1,493**	**1,493**	**1,493**	**1,493**	**1,493**
Investment Costs												
Investment Cost/yr. for Basic Skills ILS workstations	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71	$3.71
Investment Cost/yr. for ESL workstations	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52	$2.52
Investment Cost/yr. for Vocational workstations	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24	$36.24
Total Investment Cost/yr.	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**	**$42.47**
Amortized Cost/yr @ 6% for 5 years	**$10.02**	**$20.04**	**$30.07**	**$40.09**	**$50.11**	**$50.11**	**$50.11**	**$50.11**	**$50.11**	**$50.11**	**$50.11**	**$50.11**
Operational Savings												
Operational Savings/yr. with Basic Skills ILS	$0.00	$5.57	$10.38	$15.19	$20.01	$24.82	$24.82	$24.82	$24.82	$24.82	$24.82	$24.82
Operational Savings/yr. with ESL Technology	$0.00	$3.43	$6.39	$9.35	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32	$12.32
Operational Savings/yr. with Vocational Technology	$0.00	$21.43	$41.87	$62.30	$82.74	$102.19	$102.19	$102.19	$102.19	$102.19	$102.19	$102.19
Total Operational Savings	**$0.00**	**$30.43**	**$58.64**	**$86.85**	**$115.06**	**$139.32**	**$139.32**	**$139.32**	**$139.32**	**$139.32**	**$139.32**	**$139.32**
Total Operational Savings - Amortized Investment Costs	**($10.02)**	**$10.39**	**$28.57**	**$46.76**	**$64.95**	**$89.21**	**$89.21**	**$89.21**	**$89.21**	**$89.21**	**$89.21**	**$89.21**

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- Implementation is phased-in over a five year period starting in 1995 to serve 30 percent of basic skills, ESL, and vocational FTES by the year 1999.

- Instructional technology is replaced every five years.

- There is a one-year lag before savings are realized.

High Tech Centers. The Commission also recommends the construction of 62 High Technology Centers to serve 20 percent of FTES by the year 2005. High Tech Centers would consist of facilities containing 100 or more learning stations and would provide (1) independently directed instruction in addition to the ILS, ESL and core vocational systems discussed above and (2) supplemental instruction to enable faculty to serve greater numbers of students.

The model shown in Table 10 is similar to those used in the tables for ILS, ESL, and core vocational systems, and generates estimates of the per-FTES cost of serving students in High Tech Centers. The basic assumptions behind the model are listed below:

- The Centers consist of from 100 to 300 stations; a 300 station Center would include 144 fully automated independent systems and 156 supplemental instruction systems. The automated systems cost $17,600 per station and supplemental systems cost $4,000 per station. The $17,600 figure is derived from the same assumptions used to estimate the cost of core vocational systems as shown above. The $4,000 figure is based on the assumption that each station would consist of a 486 CPU computer, a high speed disk drive, color monitor, peripherals costing $3,000, and software costing $1,000.

- Centers are open 35 weeks each year for 100 hours each week, or the equivalent; thus, they are utilized 40 percent of the time. Given allowances for maintenance and other down time, the Centers are 80 percent efficient in terms of generating student learning hours on their systems.

- A 300 station centers is located in facilities costing $7.5 million each to provide 100 square feet of space per station at a construction cost of $250 per square foot.

- Maintaining the hardware for 300 stations would cost $210,000 per year.

- Fifteen systems administrators at a cost of $25,000 each would be needed to staff a 300 station center.

Using a methodology identical to that described above, the top third of Table 10 shows the faculty and support costs associated with implementing the 144 station fully automated systems portion of a 300 station Center under varying assumptions of how many hours on the system are required to complete the course.

Table 10

Estimated Cost/FTES of Providing Instruction via Fully Automated and Supplementary Systems in a 300 Station Technology Center

Automated Systems Detail (144 Systems)

Hours to Complete Course	10	20	30	40	50	60
Students Accommodated in a year	40,366	20,183	13,455	10,092	8,073	6,728
Faculty Hours for 144 Systems	10,092	10,092	10,092	10,092	10,092	10,092
Faculty for 144 Systems	8.24	8.24	8.24	8.24	8.24	8.24
Faculty cost	$453,089	$453,089	$453,089	$453,089	$453,089	$453,089
Support Staff Cost @88% of Faculty Costs	$401,796	$401,796	$401,796	$401,796	$401,796	$401,796
Total Staff Costs for Automated Systems	$854,884	$854,884	$854,884	$854,884	$854,884	$854,884
FTES Served by 144 Automated Systems	4,036.61	2,018.30	1,345.54	1,009.15	807.32	672.77

Supplemental Systems Detail (156 Systems)

Productivity of Faculty	1.00	1.50	2.00	2.50	3.00	3.50
Computer Hours/Student/Course	10	15	20	25	30	35
Students Accomodated by 156 Systems	43,730	29,153	21,865	17,492	14,577	12,494
Faculty needed	145.77	64.79	36.44	23.32	16.20	11.90
Faculty Cost	$8,017,152	$3,563,179	$2,004,288	$1,282,744	$890,795	$654,461
# Faculty Teaching Aids	0.00	32.39	36.44	34.98	32.39	29.75
Teaching Aids cost	$0	$589,544	$663,237	$636,708	$589,544	$541,418
Support Staff Cost @ 88% of Faculty & Teaching Aid Costs	$7,109,550	$3,682,603	$2,365,541	$1,702,156	$1,312,753	$1,060,497
Total Staff Costs for Supplemental Systems	$15,126,702	$7,835,326	$5,033,066	$3,621,607	$2,793,092	$2,256,376
FTES Served by 156 Supplemental Systems	4,372.99	2,915.33	2,186.50	1,749.20	1,457.66	1,249.43

Cost/FTES Assuming Students Require 30 Hours to Complete Course on Automated Systems

Productivity of Faculty	1.00	1.50	2.00	2.50	3.00	3.50
Total FTES	5,718.53	4,260.86	3,532.03	3,094.73	2,803.20	2,594.96
Staff Costs per year	$15,981,586	$8,690,210	$5,887,951	$4,476,492	$3,647,976	$3,111,261
Amortized Hardware & Software costs per year	$745,382	$745,382	$745,382	$745,382	$745,382	$745,382
Amortized Facilities Cost per year	$611,250	$611,250	$611,250	$611,250	$611,250	$611,250
Equipment Maintenence & Systems Admin. Costs per year	$585,000	$585,000	$585,000	$585,000	$585,000	$585,000
Total Cost per year	$17,923,219	$10,631,843	$7,829,583	$6,418,124	$5,589,609	$5,052,893
Cost/FTES	$3,134.24	$2,495.23	$2,216.74	$2,073.89	$1,994.01	$1,947.19
Cost/FTES w/o Amortized Facilities & Hardware Costs	$2,897.00	$2,176.84	$1,832.64	$1,635.52	$1,510.05	$1,424.40

The middle section of Table 10 shows estimated staff and support costs for systems used by faculty to supplement the instructional program. The concept of the supplemental system is the proposition that faculty could serve significantly larger numbers of students if the students spend time at a supplemental workstation. For example, if a typical faculty member currently teachers five courses per semester with 30 students in each course, he or she might teach 300 students in a two-semester academic year. The table shows the estimated cost of providing instruction using a supplemental system assuming the number of students taught by faculty increases sharply as students spend increasing amounts of time using the supplemental systems. Specifically, the table shows that the model assumes that faculty could serve 300 students if each student spends 10 hours on the system, 600 students if 20 hours are spent on the system, and so on. The model also assumes that a sufficient number of teaching assistants are provided to maintain the student:staff ratio at 300:1—in effect replacing time now spent wholly by faculty with a combination of faculty, teaching assistant, and supplemental computer instruction.

The bottom portion of Table 10 shows the cost of serving each FTES in a High Tech Center via the two (automated and supplemental) strategies. This portion of the table assumes that it takes 30 hours to complete automated courses (as shown in the shaded column in the top third of the table) and shows how the cost varies depending on how much one assumes that faculty productivity is increased through the use of supplemental systems and teaching assistants. The estimates underlying the Commission's recommendations (shown in the shaded columns) assume that the combination of technology and teaching assistants enables faculty productivity to increase by a factor of three, leading to a per-FTES cost of $1,510 (or $1,994 if debt costs are included).

Since High Tech Centers require a certain degree of scale in order to operate, Table 11 estimates the number of districts that have sufficient enrollment to justify at least one 100 station Center. The table shows that 62 districts are of sufficient size, and that the number of stations in each district would range from just over 100 to over 2,000. The table also shows the estimated costs and savings by district, using figures from the previous table.

Table 12 shows the estimated annual costs and savings from High Tech Centers assuming they are phased in beginning in 1996. Specifically, the table shows the costs of implementing the Centers assuming they are built in districts in alphabetical order, with work on the first three Centers beginning in 1994, another six beginning in each year from 1995 through 2000, and so on as displayed in the table. The table also assumes that it takes two full years to build, equip, and open the centers. Thus, no savings are assumed until year three. Given these assumptions, the table shows that such Centers could lead to operational savings of over $454 million per year by 2005.

Figure 1 shows that the investment in technology recommended by the Commission is estimated to be quite similar to what the colleges will have to spend on "brick-and-mortar" strategies to accommodate growth—unless facilities can be used more efficiently. The next section discusses the technical and cost assumptions underlying Commission recommendations that would enable the community colleges to accommodate most additional enrollment without building additional facilities. "Trading" the cost of facilities for the cost of technology would

Table 11

Estimated Number of Districts Able to Support Technology Centers and Estimated Savings

(Millions of 1991 Constant $s)

	FTES Demand in 2005-06	FTES served if 20% of 2005 Demand >1000 FTES	# Stations in Tech. Center	Equipment Investment	Facilities Investment	Initial Investment Cost	Equipment Replacement Cost	Total Savings/yr.
Allan Hancock	11,474	2,294	245	$2.58	$6.14	$8.72	$2.58	$3.83
Antelope Valley	14,218	2,843	304	$3.20	$7.61	$10.81	$3.20	$4.75
Barstow	2,259	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Butte	14,670	2,934	313	$3.31	$7.85	$11.16	$3.31	$4.90
Cabrillo	13,656	2,731	292	$3.08	$7.31	$10.38	$3.08	$4.56
Cerritos	18,984	3,796	406	$4.28	$10.16	$14.43	$4.28	$6.34
Chaffey	17,594	3,518	376	$3.96	$9.41	$13.38	$3.96	$5.88
Citrus	11,141	2,228	238	$2.51	$5.96	$8.47	$2.51	$3.72
Coast	43,772	8,754	936	$9.86	$23.42	$33.28	$9.86	$14.63
Compton	5,080	1,016	108	$1.14	$2.72	$3.86	$1.14	$1.70
Contra Costa	41,172	8,234	881	$9.28	$22.03	$31.31	$9.28	$13.76
Desert	11,584	2,316	247	$2.61	$6.20	$8.81	$2.61	$3.87
El Camino	23,783	4,756	508	$5.36	$12.72	$18.08	$5.36	$7.95
Feather River	1,074	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Foothill	40,098	8,019	858	$9.04	$21.45	$30.49	$9.04	$13.40
Fremont-Newark	8,933	1,786	191	$2.01	$4.78	$6.79	$2.01	$2.98
Gavilan	5,993	1,198	128	$1.35	$3.21	$4.56	$1.35	$2.00
Glendale	17,151	3,430	367	$3.86	$9.18	$13.04	$3.86	$5.73
Grossmont	22,444	4,488	480	$5.06	$12.01	$17.06	$5.06	$7.50
Hartnell	8,175	1,634	174	$1.84	$4.37	$6.21	$1.84	$2.73
Imperial	7,203	1,440	154	$1.62	$3.85	$5.48	$1.62	$2.41
Kern	20,688	4,137	442	$4.66	$11.07	$15.73	$4.66	$6.91
Lake Tahoe	1,926	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Lassen	3,640	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Long Beach	25,147	5,029	538	$5.67	$13.46	$19.12	$5.67	$8.41
Los Angeles	104,593	20,918	2,238	$23.57	$55.97	$79.53	$23.57	$34.96
Los Rios	54,299	10,859	1,162	$12.23	$29.05	$41.29	$12.23	$18.15
Marin	9,564	1,912	204	$2.15	$5.12	$7.27	$2.15	$3.20
Mendicino	3,410	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Merced	12,982	2,596	277	$2.92	$6.95	$9.87	$2.92	$4.34
Mira Costa	11,584	2,316	247	$2.61	$6.20	$8.81	$2.61	$3.87
Montery	8,865	1,773	189	$2.00	$4.74	$6.74	$2.00	$2.96
Mt San Antonio	29,187	5,837	624	$6.58	$15.62	$22.19	$6.58	$9.76
Mt. San Jacinto	8,038	1,607	171	$1.81	$4.30	$6.11	$1.81	$2.69

Table 11 (Cont.)

	FTES Demand in 2005-06	FTES served if 20% of 2005 Demand >1000 FTES	# Stations in Tech. Center	Equipment Investment	Facilities Investment	Initial Investment Cost	Equipment Replacement Cost	Total Savings/yr.
Napa	7,373	1,474	157	$1.66	$3.94	$5.60	$1.66	$2.46
North Orange	41,300	8,259	883	$9.31	$22.10	$31.40	$9.31	$13.80
Palo Verde	1,074	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Palomar	24,729	4,945	529	$5.57	$13.23	$18.80	$5.57	$8.27
Pasadena	26,238	5,247	561	$5.91	$14.04	$19.95	$5.91	$8.77
Peralta	22,913	4,582	490	$5.16	$12.26	$17.42	$5.16	$7.66
Rancho Santiago	30,952	6,190	662	$6.97	$16.56	$23.54	$6.97	$10.35
Redwoods	8,251	1,650	176	$1.86	$4.41	$6.27	$1.86	$2.76
Rio Hondo	14,892	2,978	318	$3.36	$7.97	$11.32	$3.36	$4.98
Riverside	24,482	4,896	523	$5.52	$13.10	$18.62	$5.52	$8.18
Saddleback	30,449	6,089	651	$6.86	$16.29	$23.15	$6.86	$10.18
San Bernadino	21,183	4,236	453	$4.77	$11.33	$16.11	$4.77	$7.08
San Diego	57,266	11,453	1,225	$12.90	$30.64	$43.55	$12.90	$19.14
San Francisco	46,781	9,356	1,001	$10.54	$25.03	$35.57	$10.54	$15.64
San Joaquin	22,998	4,599	492	$5.18	$12.30	$17.49	$5.18	$7.69
San Jose	18,958	3,791	405	$4.27	$10.14	$14.41	$4.27	$6.34
San Luis Obispo	10,272	2,054	219	$2.31	$5.50	$7.81	$2.31	$3.43
Sam Mateo	25,419	5,083	543	$5.73	$13.60	$19.33	$5.73	$8.50
Santa Barbara	16,077	3,215	344	$3.62	$8.60	$12.22	$3.62	$5.37
Santta Clanta	9,803	1,960	209	$2.21	$5.24	$7.45	$2.21	$3.28
Santa Monica	20,535	4,106	439	$4.63	$10.99	$15.61	$4.63	$6.86
Sequoias	11,397	2,279	243	$2.57	$6.10	$8.67	$2.57	$3.81
Shasta	10,979	2,195	234	$2.47	$5.87	$8.35	$2.47	$3.67
Sierra	15,702	3,140	336	$3.54	$8.40	$11.94	$3.54	$5.25
Siskiyou	3,180	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
Solano	13,161	2,632	281	$2.97	$7.04	$10.01	$2.97	$4.40
Sonoma	24,746	4,949	529	$5.58	$13.24	$18.82	$5.58	$8.27
South County	19,401	3,880	415	$4.37	$10.38	$14.75	$4.37	$6.49
Southwestern	17,867	3,573	382	$4.03	$9.56	$13.59	$4.03	$5.97
State Center	29,110	5,822	623	$6.56	$15.58	$22.14	$6.56	$9.73
Ventura	30,619	6,123	655	$6.90	$16.38	$23.28	$6.90	$10.23
Victor Valley	11,039	2,207	236	$2.49	$5.90	$8.39	$2.49	$3.69
West Hills	2,745	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
West Kern	1,159	0	0	$0.00	$0.00	$0.00	$0.00	$0.00
West Valley-Missi	20,765	4,153	444	$4.68	$11.11	$15.79	$4.68	$6.94
Yosemite	22,615	4,522	483	$5.09	$12.10	$17.19	$5.09	$7.56
Yuba	11,397	2,279	243	$2.57	$6.10	$8.67	$2.57	$3.81
Totals	**1,362,209**	**268,316**	**28,682**	**$0.00**	**$0.00**	**$1,020.20**	**$302.31**	**$454.95**

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Table 12

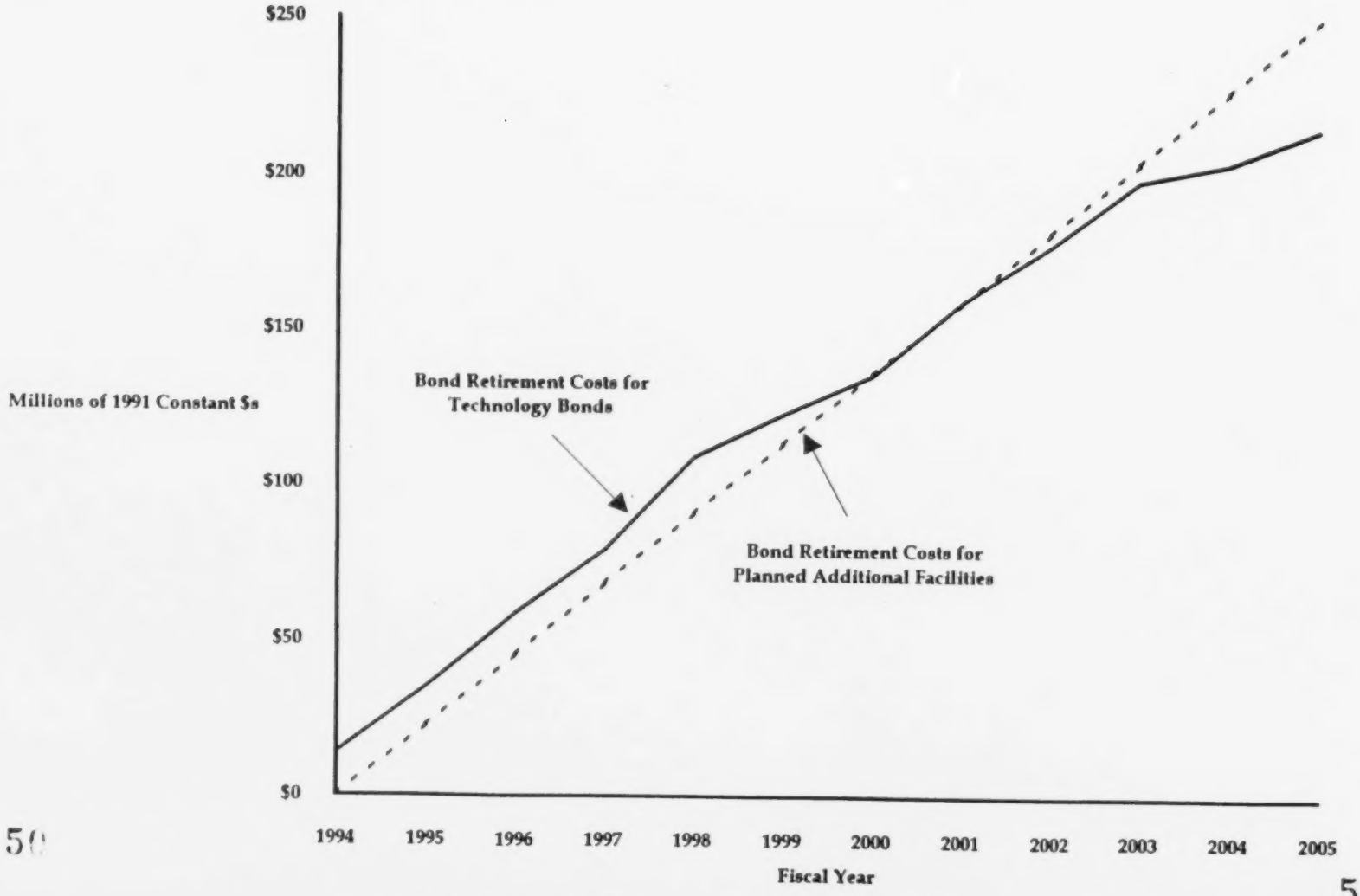
Annual Costs and Savings from Implementing 62 Technology Centers

(Millions of 1991 Constant $s)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Number of Technology Centers	3	6	6	6	6	6	6	8	8	7	0	0
Facilities Investment Costs	$21.59	$58.98	$70.39	$53.93	$108.02	$73.23	$70.59	$117.15	$67.27	$76.73	$0.00	$0.00
Initial Equipment Investment Costs	$9.09	$24.84	$29.64	$22.71	$45.49	$30.84	$29.73	$49.34	$28.33	$32.31	$0.00	$0.00
Recurring Investment Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$9.09	$24.84	$29.64	$22.71	$45.49
Total Investment/yr.	**$30.69**	**$83.81**	**$100.03**	**$76.65**	**$153.51**	**$104.06**	**$100.32**	**$175.58**	**$120.43**	**$138.69**	**$22.71**	**$45.49**
Amortized Facilities Costs	$1.76	$4.81	$5.74	$4.40	$8.80	$5.97	$5.75	$9.55	$5.48	$6.25	$0.00	$0.00
Amortized Facilities Costs per year	**$1.76**	**$6.57**	**$12.30**	**$16.70**	**$25.50**	**$31.47**	**$37.22**	**$46.77**	**$52.25**	**$58.51**	**$58.51**	**$58.51**
Amortized Initial Equipment Costs	$2.15	$5.86	$7.00	$5.36	$10.74	$7.28	$7.02	$11.64	$6.69	$7.63	$0.00	$0.00
Amortized Equipment Replacement Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$2.15	$5.86	$7.00	$5.36	$10.74
Total Amortized Equipment Costs per year	**$2.15**	**$8.01**	**$15.00**	**$20.36**	**$31.10**	**$38.38**	**$45.39**	**$59.18**	**$71.73**	**$86.35**	**$91.71**	**$102.45**
Operational Savings from 1st 3 Technology Centers	$0.00	$0.00	$13.49	$13.49	$13.49	$13.49	$13.49	$13.49	$13.49	$13.49	$13.49	$13.49
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$36.84	$36.84	$36.84	$36.84	$36.84	$36.84	$36.84	$36.84	$36.84
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$0.00	$43.97	$43.97	$43.97	$43.97	$43.97	$43.97	$43.97	$43.97
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$33.69	$33.69	$33.69	$33.69	$33.69	$33.69	$33.69
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$67.48	$67.48	$67.48	$67.48	$67.48	$67.48
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$45.75	$45.75	$45.75	$45.75	$45.75
Operational Savings from Next 6 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$44.10	$44.10	$44.10	$44.10
Operational Savings from Next 8 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$73.19	$73.19	$73.19
Operational Savings from Next 8 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$42.02	$42.02
Operational Savings from Next 7 Technology Centers	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$54.42
Total Operational Savings per year	**$0.00**	**$0.00**	**$13.49**	**$50.33**	**$94.30**	**$128.00**	**$195.48**	**$241.22**	**$285.33**	**$358.51**	**$400.53**	**$454.95**
Total Operational Savings - Amortized Investment Costs	**($3.91)**	**($14.57)**	**($13.82)**	**$13.27**	**$37.70**	**$58.15**	**$112.86**	**$135.27**	**$161.34**	**$213.65**	**$250.32**	**$294.00**

Figure 1

Substituting High Productivity Technology for Business As Usual Facilities



Note: Technology bond costs include cost of constructing High Tech Centers

enable the community colleges to accommodate enrollment growth with lower operational costs and at the same time improve the effectiveness of college instructional programs.

III. FACILITIES RECOMMENDATIONS

Current estimates show that the community colleges face an estimated $6 billion in facilities needs between 1992 and 2005.[19] Of the $6 billion, an estimated $1.8 billion is needed for repairs and renovations. Much of the remainder is needed for expanding existing campuses or building new campuses and centers to meet the anticipated increase in demand for community college instruction. The Commission's estimates show that by adopting three strategies to make more efficient use of new and existing facilities, much of the anticipated increase in demand can be served without new construction.

The Commission recommends employing three major strategies in order to accommodate at least 75 percent of new students who enroll over the next 12 years: (1) greatly expanded use of distance education techniques, (2) making greater use of facilities during afternoon hours and (3) year-round operations.

Specifically, the Commission recommends that additional enrollment demand be accommodated as much as possible through distance education, afternoon course scheduling, and year-round operations before the Board of Governors approves plans to build more facilities. The Commission developed models to explore the feasibility of these three cost-saving facilities strategies and to estimate the number of FTES who could be served by using these strategies rather than by constructing new facilities. Models were first developed to explore each of the three individual strategies as **stand-alone** innovations. Later, a larger model was developed to estimate reductions in facilities needs resulting from **combining all three** strategies on a district-by-district basis.

In addition to these three main facilities cost avoidance recommendations, the Commission recommends:

- the use of master course scheduling techniques;
- joint use facilities planning between community colleges and other local agencies and entities;
- a new block grant process to streamline the facilities planning and construction process; and
- removing statutory and regulatory barriers to enable colleges to lease off-campus facilities.

These additional recommendations should significantly reduce the cost and complexity of community college facilities planning and construction, and should also enable community

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[19]California Postsecondary Education Commission, *Prospects for Long-Range Capital Planning in California Public Higher Education: A Preliminary Review*. Sacramento, CA: January 1992.

colleges to enter into cost-effective and flexible leasing arrangements. However, Commission estimates do not assume any cost savings from these four recommendations.

Estimating Growth in FTES

In order to model the effects of the facilities cost savings strategies, it is first necessary to estimate future growth in the demand for instruction. District-by-district estimates of FTES demand through the year 2005 are not currently available. The Chancellor's Office projects FTES demand through 2005-06, but such data are not district-specific.[20] The Commission generated a proxy for FTES growth using district-specific data on weekly student contact hours (WSCH).[21] Though WSCH data are available on a district-specific basis, such projections extend only to the year 2000-01. Therefore, Commission staff estimated district-specific FTES figures by converting WSCH data through 2000-01 into FTES figures. For the remaining years, the FTES figures are projected using Chancellor's Office statewide demand figures. The results of these calculations are shown in Table 13.

The Chancellor's Office FTES projection model is a so-called "pure demand" model that attempts to estimate growth in community college FTES on the basis of several independent variables:

1. Projected system wide revenues from federal, state, local, and student sources.
2. Student costs such as books and fees, offset by estimated financial aid.
3. Adult population as projected by the California Department of Finance.
4. Unemployment as estimated by the Department of Finance and Employment Development Department.

The estimates developed by these methodologies may and will differ from actual enrollment due to a variety of factors. The model developed by the Commission is not intended to predict the actual level of enrollment. Consistent with its charge to find ways to accommodate *all demand* in an era of limited resources, the Commission estimated what enrollment would be if the State enabled the colleges to accept all students who wanted to enroll, rather than restrict enrollment through funding caps and higher fees that are already limiting access. Table 13 shows district-by-district estimates of demand versus capacity by assuming (conservatively) that all districts were at full capacity as of 1992-93. The last two columns of the table show estimated unhoused demand and the estimated portion of unhoused demand that would be served by

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[20]FTES projections are from California Community Colleges, Chancellor's Office, "Research and Analysis Memo # 93-15," May 4, 1993. Sacramento, CA: 1993.

[21]WSCH data are from California Department of Finance, Demographics Research Unit, "1992 Series Projection of CCC Annualized Weekly Student Contact Hours." Sacramento, CA: 1992.

Table 13

Projected California Community College FTES Demand

	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	Net Increase 1992-2005	Demand met by Pipeline $'s
Allan Hancock	8,530	8,751	8,914	8,960	8,930	8,963	8,981	9,007	9,466	9,657	10,105	10,693	11,191	11,474	2,943	324
Antelope Valley	7,922	8,127	8,279	8,321	8,294	8,324	8,340	8,365	11,730	11,967	12,523	13,251	13,868	14,218	6,296	693
Barstow	1,722	1,766	1,799	1,809	1,803	1,809	1,813	1,818	1,864	1,901	1,990	2,105	2,203	2,259	537	59
Butte	10,702	10,979	11,184	11,241	11,204	11,245	11,267	11,301	12,103	12,348	12,921	13,672	14,309	14,670	3,968	436
Cabrillo	10,726	11,003	11,209	11,266	11,229	11,270	11,292	11,326	11,266	11,494	12,027	12,726	13,319	13,656	2,930	322
Cerritos	15,102	15,492	15,781	15,862	15,810	15,867	15,899	15,946	15,661	15,978	16,720	17,691	18,515	18,984	3,882	427
Chaffey	11,824	12,129	12,356	12,419	12,379	12,423	12,448	12,485	14,515	14,809	15,496	16,396	17,160	17,594	5,770	635
Citrus	9,131	9,366	9,541	9,590	9,559	9,593	9,613	9,641	9,191	9,377	9,813	10,383	10,867	11,141	2,011	221
Coast	36,728	37,676	38,381	38,576	38,451	38,589	38,667	38,780	36,112	36,842	38,552	40,793	42,693	43,772	7,044	775
Compton	4,162	4,270	4,350	4,372	4,358	4,373	4,382	4,395	4,191	4,276	4,475	4,735	4,955	5,080	918	101
Contra Costa	32,155	32,985	33,602	33,773	33,663	33,784	33,852	33,952	33,967	34,654	36,262	38,370	40,157	41,172	9,017	992
Desert	7,985	8,191	8,345	8,387	8,360	8,390	8,407	8,432	9,557	9,750	10,203	10,796	11,299	11,584	3,599	396
El Camino	19,399	19,899	20,272	20,375	20,309	20,382	20,423	20,483	19,621	20,018	20,946	22,164	23,196	23,783	4,384	482
Feather River	821	843	858	863	860	863	865	867	886	904	946	1,001	1,048	1,074	253	28
Foothill	34,501	35,391	36,053	36,237	36,119	36,249	36,322	36,429	33,081	33,750	35,316	37,369	39,109	40,098	5,598	616
Fremont-Newark	7,211	7,397	7,536	7,574	7,550	7,577	7,592	7,614	7,370	7,519	7,868	8,325	8,713	8,933	1,722	189
Gavilan	4,581	4,699	4,787	4,812	4,796	4,813	4,823	4,837	4,944	5,044	5,278	5,585	5,845	5,993	1,411	155
Glendale	13,143	13,482	13,734	13,804	13,760	13,809	13,837	13,878	14,149	14,436	15,105	15,983	16,728	17,151	4,008	441
Grossmont	17,590	18,044	18,381	18,475	18,415	18,481	18,518	18,573	18,517	18,891	19,768	20,917	21,891	22,444	4,854	534
Hartnell	6,224	6,385	6,504	6,537	6,516	6,539	6,553	6,572	6,744	6,881	7,200	7,618	7,973	8,175	1,951	215
Imperial	5,237	5,372	5,472	5,500	5,482	5,502	5,513	5,529	5,942	6,063	6,344	6,713	7,025	7,203	1,966	216
Kern	15,015	15,403	15,691	15,771	15,719	15,776	15,808	15,854	17,068	17,413	18,221	19,280	20,178	20,688	5,673	624
Lake Tahoe	1,327	1,361	1,387	1,394	1,389	1,394	1,397	1,401	1,589	1,621	1,697	1,795	1,879	1,926	600	66
Lassen	2,938	3,014	3,070	3,086	3,076	3,087	3,093	3,102	3,003	3,064	3,206	3,392	3,550	3,640	702	77
Long Beach	20,125	20,645	21,031	21,138	21,069	21,145	21,188	21,250	20,746	21,165	22,148	23,435	24,527	25,147	5,021	552
Los Angeles	85,390	87,595	89,233	89,687	89,395	89,717	89,898	90,163	86,289	88,034	92,119	97,473	102,014	104,593	19,202	2,112
Los Rios	39,745	40,771	41,534	41,745	41,609	41,759	41,843	41,966	44,797	45,703	47,824	50,603	52,961	54,299	14,554	1,601
Marin	9,044	9,277	9,451	9,499	9,468	9,502	9,521	9,549	7,890	8,050	8,424	8,913	9,328	9,564	520	57
Mendicino	2,543	2,609	2,658	2,671	2,663	2,672	2,678	2,685	2,813	2,870	3,003	3,178	3,326	3,410	866	95
Merced	8,728	8,953	9,121	9,167	9,137	9,170	9,189	9,216	10,711	10,927	11,434	12,099	12,662	12,982	4,255	468
Mira Costa	8,396	8,613	8,774	8,819	8,790	8,821	8,839	8,865	9,557	9,750	10,203	10,796	11,299	11,584	3,188	351
Monterey	7,188	7,373	7,511	7,549	7,525	7,552	7,567	7,589	7,314	7,462	7,808	8,262	8,647	8,865	1,678	185
Mt San Antonio	22,226	22,800	23,226	23,345	23,269	23,352	23,400	23,468	24,079	24,566	25,706	27,200	28,467	29,187	6,961	766
Mt San Jacinto	4,692	4,813	4,903	4,928	4,912	4,929	4,939	4,954	6,632	6,766	7,080	7,491	7,840	8,038	3,347	368
Napa	5,790	5,939	6,050	6,081	6,061	6,083	6,095	6,113	6,083	6,206	6,494	6,872	7,192	7,373	1,584	174
North Orange	34,730	35,626	36,292	36,477	36,359	36,489	36,563	36,671	34,072	34,762	36,375	38,489	40,282	41,300	6,570	723
Palo Verde	845	867	883	888	885	888	890	892	886	904	946	1,001	1,048	1,074	229	25
Palomar	16,998	17,436	17,762	17,853	17,795	17,859	17,895	17,947	20,401	20,814	21,780	23,046	24,119	24,729	7,731	850

Table 13 (Cont.)

	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	Net Increase 1992-2005	Demand met by Pipeline $'s
Pasadena	21,460	22,014	22,426	22,540	22,467	22,548	22,593	22,659	21,646	22,084	23,109	24,452	25,591	26,238	4,777	526
Peralta	18,783	19,267	19,628	19,728	19,664	19,734	19,774	19,832	18,903	19,286	20,181	21,354	22,348	22,913	4,131	454
Rancho Santiago	25,804	26,470	26,965	27,103	27,015	27,112	27,166	27,246	25,535	26,051	27,260	28,845	30,188	30,952	5,147	566
Redwoods	6,374	6,539	6,661	6,695	6,673	6,697	6,711	6,730	6,807	6,945	7,267	7,690	8,048	8,251	1,877	207
Rio Hondo	12,124	12,437	12,670	12,734	12,693	12,738	12,764	12,802	12,286	12,534	13,116	13,878	14,525	14,892	2,768	304
Riverside	16,919	17,355	17,680	17,770	17,712	17,776	17,812	17,864	20,197	20,606	21,562	22,815	23,878	24,482	7,563	832
Saddleback	22,345	22,922	23,350	23,469	23,393	23,477	23,524	23,594	25,120	25,628	26,817	28,376	29,698	30,449	8,104	891
San Bernadino	14,904	15,289	15,575	15,654	15,603	15,660	15,691	15,737	17,476	17,829	18,657	19,741	20,661	21,183	6,278	691
San Diego	45,598	46,775	47,650	47,892	47,737	47,908	48,005	48,146	47,244	48,200	50,437	53,368	55,854	57,266	11,668	1,283
San Francisco	41,317	42,383	43,176	43,396	43,255	43,410	43,498	43,626	38,594	39,375	41,202	43,597	45,628	46,781	5,464	601
San Joaquin	16,160	16,577	16,887	16,973	16,918	16,979	17,013	17,063	18,974	19,357	20,256	21,433	22,431	22,998	6,838	752
San Jose	16,152	16,569	16,879	16,965	16,910	16,971	17,005	17,055	15,640	15,957	16,697	17,668	18,491	18,958	2,806	309
San Luis Obispo	7,203	7,389	7,528	7,566	7,541	7,568	7,584	7,606	8,474	8,646	9,047	9,573	10,018	10,272	3,068	338
Sam Mateo	21,737	22,298	22,715	22,830	22,756	22,838	22,884	22,951	20,971	21,395	22,388	23,689	24,793	25,419	3,683	405
Santa Barbara	13,459	13,806	14,065	14,136	14,090	14,141	14,169	14,211	13,263	13,532	14,159	14,982	15,680	16,077	2,618	288
Santta Clarita	5,300	5,437	5,538	5,567	5,548	5,568	5,580	5,596	8,087	8,251	8,634	9,136	9,561	9,803	4,503	495
Santa Monica	16,500	16,926	17,242	17,330	17,274	17,336	17,371	17,422	16,941	17,284	18,086	19,137	20,029	20,535	4,035	444
Sequoias	8,009	8,216	8,369	8,412	8,385	8,415	8,432	8,457	9,402	9,593	10,038	10,621	11,116	11,397	3,388	373
Shasta	8,207	8,418	8,576	8,619	8,591	8,622	8,640	8,665	9,058	9,241	9,670	10,232	10,709	10,979	2,773	305
Sierra	10,821	11,100	11,308	11,365	11,328	11,369	11,392	11,426	12,954	13,216	13,829	14,633	15,315	15,702	4,881	537
Siskiyou	2,472	2,536	2,583	2,597	2,588	2,597	2,603	2,610	2,623	2,676	2,800	2,963	3,101	3,180	707	78
Solano	9,115	9,350	9,525	9,574	9,542	9,577	9,596	9,624	10,858	11,078	11,592	12,266	12,837	13,161	4,047	445
Sonoma	19,043	19,535	19,900	20,002	19,936	20,008	20,048	20,107	20,415	20,828	21,795	23,062	24,136	24,746	5,703	627
South County	15,307	15,702	15,996	16,078	16,025	16,083	16,115	16,163	16,006	16,330	17,087	18,081	18,923	19,401	4,094	450
Southwestern	13,672	14,025	14,287	14,360	14,314	14,365	14,394	14,436	14,740	15,038	15,736	16,651	17,426	17,867	4,195	461
State Center	20,418	20,945	21,336	21,445	21,375	21,452	21,495	21,559	24,016	24,502	25,639	27,129	28,393	29,110	8,693	956
Ventura	24,517	25,150	25,620	25,751	25,667	25,759	25,811	25,887	25,261	25,772	26,968	28,535	29,864	30,619	6,102	671
Victor Valley	6,769	6,944	7,074	7,110	7,086	7,112	7,126	7,147	9,107	9,291	9,722	10,288	10,767	11,039	4,270	470
West Hills	2,117	2,171	2,212	2,223	2,216	2,224	2,229	2,235	2,264	2,310	2,417	2,558	2,677	2,745	628	69
West Kern	861	883	900	904	901	905	906	909	956	976	1,021	1,080	1,131	1,159	298	33
West Valley-Mission	17,669	18,125	18,464	18,558	18,498	18,564	18,602	18,656	17,131	17,478	18,289	19,352	20,253	20,765	3,096	341
Yosemite	15,797	16,205	16,508	16,592	16,538	16,597	16,631	16,680	18,657	19,035	19,918	21,075	22,057	22,615	6,818	750
Yuba	8,246	8,459	8,617	8,661	8,633	8,664	8,681	8,707	9,402	9,593	10,038	10,621	11,116	11,397	3,151	347
Totals	1,056,295	1,083,561	1,103,825	1,109,449	1,105,838	1,109,816	1,112,052	1,115,327	1,123,822	1,146,551	1,199,758	1,269,487	1,328,624	1,362,209	305,914	33,649

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facilities that are currently funded but not yet constructed. Subtracting the latter from the former yields the estimated remaining unhoused demand.

Estimating Avoided Construction Costs

The model estimates savings from avoided facilities costs by (1) examining Chancellor's Office estimates of future construction costs, (2) estimating the proportion of these costs that would accommodate new demand, and (3) calculating how such costs could be reduced through the three cost savings strategies recommended by the Commission. To estimate the construction cost savings that could be realized by accommodating growth in FTES without constructing additional facilities, the Commission first estimated the per-FTES cost of building facilities—by estimating the cost of facilities that would be needed to accommodate growth and dividing this amount by the estimated growth in FTES. These calculations are discussed below and shown in Table 14.

Table 14 shows that there is an estimated $3.6 billion in facilities expansion needs between 1992 and 2005. This includes $1.5 billion that is part of the Chancellor's 1992-93—1994-95 five year capital outlay plan—of which $300 million is allocated for remodeling.[22] In addition, it includes nearly $250 million per year for space expansion through 2005.[23] Though some of the remodeling funds could very well lead to expanded facilities, Commission staff assumed that none of these funds are expansion-related and therefore none would be available for savings. The table also displays how these estimated needs are allocated among new versus existing campuses.

Table 14 shows that of the estimated growth of 305,914 FTES, an estimated 75 percent would be accommodated at existing campuses, and the remainder at new campuses[24] The bottom line of the table shows that per-FTES facilities expansion costs are estimated at $9,508 per FTES at existing campuses ($2.181 billion divided by 229,436 FTES) and $19,025 at new campuses. The Commission used these figures to estimate the savings potential of accommodating growth FTES through the three major recommended strategies.

The Commission also assumed that, of the $3.6 billion in total space expansion needs, some $500 million is already allocated and thus cannot be "saved" (it is "in the pipeline") and that 80

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[22]Separate cost figures for remodeling were not available. To estimate remodeling costs, Commission staff conducted a project-by-project review of the CCC *Five Year Capital Outlay Plan* to separate remodeling costs from new facilities and facilities expansion costs. Where planned projects were shown as a mix of new construction and remodeling, staff conservatively counted the proposed construction cost as allocated entirely for remodeling. See California Community Colleges, Chancellor's Office, *1992-93 Five Year Capital Outlay Plan*. Sacramento, CA: 1992.

[23]Ibid., and CPEC, op. cit.

[24]California Community Colleges, op. cit. The Five Year Plan proposes that 75 percent of anticipated increased enrollment be accommodated by "building-out" existing campuses and that the remaining 25 percent would be accommodated by building new campuses or centers or converting existing community college centers to campuses.

Table 14

Estimated Cost/FTES for Facilities Space Expansion

Facility Space Expansion Needs

	Existing	New	Total
Amount Allocated for Space Expansion 1992-1994	$900,000,000	$300,000,000	$1,200,000,000
Amount Allocated for Space Expansion 1995 - 2005	$1,281,500,000	$1,155,000,000	$2,436,500,000
Total Space Expansion	**$2,181,500,000**	**$1,455,000,000**	**$3,636,500,000**
Amount in Pipeline	$375,000,000	$125,000,000	$500,000,000
Pipeline $s for Remodelling @ 20%	$75,000,000	$25,000,000	$100,000,000
Amount of Pipeline for Space Expansion	**$300,000,000**	**$100,000,000**	**$400,000,000**
Total Remaing Space Expansion	**$1,881,500,000**	**$1,355,000,000**	**$3,236,500,000**

Anticipated FTES Growth

	Existing	New	Total
Total increase in FTES (75% Existing and 25% New)	229,436	76,479	305,914
Future Demand Satisfied by Pipeline $s	25,237	8,412	33,649
Remaining Future Demand	**204,199**	**68,066**	**272,265**

Estimated Cost/FTES

	Existing	New
Total Space Expansion	$2,181,500,000	$1,455,000,000
Total Growth in FTES	229,436	76,479
Cost/FTES of Facilities Space Expansion	**$9,508**	**$19,025**

percent of these funds are related to expansion.[25] Subtracting 80 percent of the $500 million from the $3.6 billion estimate of total space expansion needs leaves an estimated $3.2 billion of space expansion funding that will still be needed. If community colleges accommodate growth through means other than building additional facilities, this $3.2 billion could be saved. The Commission estimated facilities savings by estimating the number of FTES that could be served by the cost savings methods described below and multiplying the FTES figure by the estimated per-FTES cost of constructing facilities, while assuming that no more than $3.2 billion is available to be saved.

Table 14 also shows that of the estimated growth of 305,914 FTES, an estimated 33,649 FTES would be accommodated by funds already "in the pipeline."[26] This leaves a total of an estimated 272,000 FTES who would need to be accommodated by the $3.2 billion in net expansion needs. This 272,000 FTES benchmark is used in the models described below as the estimate of the number of FTES that would need to be accommodated by the community colleges through 2005.

Facilities Strategies Implemented Independently

For the purpose of estimating potential facilities savings resulting from the three facilities strategies, the Commission first estimated the number of FTES that could be served by each strategy implemented as an independent, stand-alone policy. The discussion on pages 97-100 in *Choosing the Future* (Recommendation III, Strategy 2, Actions 2-4, including Figures 8, 9, and 10) takes this approach. The next six tables show these estimates and the resulting savings assuming varying levels of implementation.

Distance Education (Recommendation III, Strategy 2, Action 2, page 97). The wide variety of possible approaches to implementing distance education was described in Section II, above. Table 15 shows the estimated number of unhoused FTES (from Table 13) that could be served at each campus if telecourse-based distance education were to serve varying percentages of FTES in the system (ranging from 5 to 20 percent). The table also shows the estimated unmet demand remaining in each district if distance education were to be implemented as a stand-alone policy (without afternoon scheduling or year-round operations). Using these "unmet demand" figures, Table 16 shows the estimated facilities savings at the varying levels of implementation if distance education is adopted as a stand-alone strategy. The model assumes that $9,508 is spent at existing and $19,025 at new campuses to accommodate each "new" FTES (see Table 14). The resulting cost of serving the unhoused demand is subtracted from the $3.2 billion space expansion cost estimate (from Table 14) to yield the estimated savings figure. Table 16 also shows the resulting savings in bond interest costs and the sum of the principal and interest costs.

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[25]The 1992-93 State Budget Act appropriated $114 million and the 1993-93 Act appropriated $421 million of these funds. The assumed 80/20 percent split is based on CPEC, op. cit., and California Community Colleges, op. cit.

[26]An estimated 33,649 FTES could be accommodated by the $400 million (80 percent) of pipeline funds assumed to be dedicated to space expansion.

Table 15

Estimated Demand for Facilities

(Telecourses as a Stand Alone Policy)

		Assumed Percent of 2005-06 Demand Served by Telecourses													
		5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%
	Remaining Demand	2005-06 FTES Demand Served by Telecourses							Unmet FTES Demand in 2005-06						
Allan Hancock	2,620	527	790	1,053	1,317	1,580	1,843	2,107	2,093	1,830	1,566	1,303	1,040	776	513
Antelope Valley	5,604	653	979	1,305	1,632	1,958	2,284	2,611	4,951	4,625	4,298	3,972	3,646	3,320	2,993
Barstow	478	104	156	207	259	311	363	415	374	322	271	219	167	115	63
Butte	3,531	673	1,010	1,347	1,683	2,020	2,357	2,693	2,858	2,521	2,185	1,848	1,511	1,175	838
Cabrillo	2,607	627	940	1,254	1,567	1,880	2,194	2,507	1,981	1,667	1,354	1,040	727	414	100
Cerritos	3,455	871	1,307	1,743	2,178	2,614	3,050	3,485	2,583	2,148	1,712	1,276	841	405	0
Chaffey	5,135	808	1,211	1,615	2,019	2,423	2,826	3,230	4,328	3,924	3,520	3,116	2,713	2,309	1,905
Citrus	1,789	511	767	1,023	1,278	1,534	1,790	2,046	1,278	1,022	767	511	255	0	0
Coast	6,269	2,009	3,014	4,018	5,023	6,027	7,032	8,037	4,260	3,256	2,251	1,246	242	0	0
Compton	817	233	350	466	583	700	816	933	584	467	351	234	117	1	0
Contra Costa	8,020	1,890	2,835	3,780	4,725	5,669	6,614	7,559	6,130	5,191	4,246	3,301	2,356	1,411	466
Desert	3,203	532	798	1,063	1,329	1,595	1,861	2,127	2,671	2,406	2,140	1,874	1,608	1,342	1,076
El Camino	3,902	1,092	1,637	2,183	2,729	3,275	3,821	4,366	2,810	2,264	1,719	1,173	627	81	0
Feather River	225	49	74	99	123	148	173	197	176	151	126	102	77	52	28
Foothill	4,982	1,841	2,761	3,681	4,601	5,522	6,442	7,362	3,141	2,221	1,301	381	0	0	0
Fremont-Newark	1,537	410	615	820	1,025	1,230	1,435	1,640	1,123	918	713	508	303	98	0
Gavilan	1,250	275	413	550	688	825	963	1,100	981	844	706	569	431	293	156
Glendale	3,567	787	1,181	1,574	1,968	2,362	2,755	3,149	2,780	2,386	1,992	1,599	1,205	812	418
Grossmont	4,320	1,030	1,545	2,060	2,575	3,091	3,606	4,121	3,290	2,775	2,260	1,745	1,230	715	200
Hartnell	1,736	375	563	750	938	1,126	1,313	1,501	1,361	1,173	986	798	611	423	235
Imperial	1,750	331	496	661	827	992	1,157	1,322	1,419	1,254	1,089	923	758	593	428
Kern	5,049	950	1,424	1,899	2,374	2,849	3,324	3,798	4,100	3,625	3,150	2,675	2,201	1,726	1,251
Lake Tahoe	534	88	133	177	221	265	309	354	445	401	357	313	268	224	180
Lassen	624	167	251	334	418	501	585	668	457	374	290	207	123	40	0
Long Beach	4,469	1,154	1,731	2,308	2,886	3,463	4,040	4,617	3,315	2,738	2,160	1,583	1,006	429	0
Los Angeles	17,090	4,801	7,201	9,602	12,002	14,402	16,803	19,203	12,289	9,889	7,488	5,088	2,688	287	0
Los Rios	12,953	2,492	3,739	4,985	6,231	7,477	8,723	9,969	10,461	9,215	7,969	6,723	5,476	4,230	2,984
Marin	463	439	658	878	1,097	1,317	1,536	1,756	24	0	0	0	0	0	0
Mendicino	771	157	235	313	391	470	548	626	615	536	458	380	302	223	145
Merced	3,787	596	894	1,192	1,490	1,788	2,086	2,384	3,191	2,893	2,595	2,297	1,999	1,701	1,403
Mira Costa	2,838	532	798	1,063	1,329	1,595	1,861	2,127	2,306	2,040	1,774	1,508	1,242	977	711
Montery	1,493	407	610	814	1,017	1,221	1,424	1,628	1,086	883	679	476	272	69	0
Mt San Antonio	6,195	1,340	2,010	2,679	3,349	4,019	4,689	5,359	4,855	4,186	3,516	2,846	2,176	1,506	836
Mt. San Jacinto	2,979	369	553	738	922	1,107	1,291	1,476	2,610	2,425	2,241	2,056	1,872	1,687	1,503
Napa	1,410	338	508	677	846	1,015	1,185	1,354	1,071	902	733	564	394	225	56
North Orange	5,848	1,896	2,844	3,791	4,739	5,687	6,635	7,583	3,952	3,004	2,056	1,108	161	0	0

Table 15 (Cont.)

		Assumed Percent of 2005-06 Demand Served by Telecourses													
		5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%
	Remaining Demand	2005-06 FTES Demand Served by Telecourses							Unmet FTES Demand in 2005-06						
Palo Verde	204	49	74	99	123	148	173	197	154	130	105	80	56	31	7
Palomar	6,881	1,135	1,703	2,270	2,838	3,405	3,973	4,540	5,746	5,178	4,611	4,043	3,476	2,908	2,341
Pasadena	4,252	1,204	1,806	2,409	3,011	3,613	4,215	4,817	3,048	2,446	1,843	1,241	639	37	0
Peralta	3,676	1,052	1,578	2,103	2,629	3,155	3,681	4,207	2,625	2,099	1,573	1,047	521	0	0
Rancho Santiago	4,581	1,421	2,131	2,841	3,552	4,262	4,972	5,683	3,160	2,450	1,740	1,029	319	0	0
Redwoods	1,671	379	568	757	947	1,136	1,326	1,515	1,292	1,103	913	724	535	345	156
Rio Hondo	2,463	684	1,025	1,367	1,709	2,051	2,392	2,734	1,780	1,438	1,096	754	413	71	0
Riverside	6,731	1,124	1,686	2,247	2,809	3,371	3,933	4,495	5,607	5,046	4,484	3,922	3,360	2,798	2,236
Saddleback	7,212	1,398	2,096	2,795	3,494	4,193	4,892	5,590	5,815	5,116	4,417	3,718	3,020	2,321	1,622
San Bernadino	5,588	972	1,458	1,945	2,431	2,917	3,403	3,889	4,615	4,129	3,643	3,157	2,671	2,185	1,699
San Diego	10,385	2,629	3,943	5,257	6,571	7,886	9,200	10,514	7,756	6,442	5,128	3,813	2,499	1,185	0
San Francisco	4,863	2,147	3,221	4,295	5,368	6,442	7,515	8,589	2,716	1,642	569	0	0	0	0
San Joaquin	6,086	1,056	1,583	2,111	2,639	3,167	3,695	4,223	5,030	4,503	3,975	3,447	2,919	2,391	1,863
San Jose	2,497	870	1,305	1,740	2,175	2,611	3,046	3,481	1,627	1,192	757	322	0	0	0
San Luis Obispo	2,731	471	707	943	1,179	1,414	1,650	1,886	2,259	2,024	1,788	1,552	1,316	1,081	845
Sam Mateo	3,278	1,167	1,750	2,333	2,917	3,500	4,084	4,667	2,111	1,527	944	361	0	0	0
Santa Barbara	2,330	738	1,107	1,476	1,845	2,214	2,583	2,952	1,592	1,223	854	485	116	0	0
Santta Clarita	4,008	450	675	900	1,125	1,350	1,575	1,800	3,558	3,333	3,108	2,883	2,658	2,433	2,208
Santa Monica	3,591	943	1,414	1,885	2,356	2,828	3,299	3,770	2,649	2,177	1,706	1,235	764	292	0
Sequoias	3,015	523	785	1,046	1,308	1,569	1,831	2,092	2,492	2,231	1,969	1,707	1,446	1,184	923
Shasta	2,468	504	756	1,008	1,260	1,512	1,764	2,016	1,964	1,712	1,460	1,208	956	704	452
Sierra	4,344	721	1,081	1,441	1,802	2,162	2,522	2,883	3,623	3,263	2,902	2,542	2,182	1,821	1,461
Siskiyou	630	146	219	292	365	438	511	584	484	411	338	265	192	119	46
Solano	3,601	604	906	1,208	1,510	1,812	2,114	2,416	2,997	2,695	2,393	2,091	1,789	1,487	1,185
Sonoma	5,075	1,136	1,704	2,272	2,840	3,408	3,975	4,543	3,940	3,372	2,804	2,236	1,668	1,100	532
South County	3,644	891	1,336	1,781	2,226	2,672	3,117	3,562	2,753	2,308	1,863	1,417	972	527	82
Southwestern	3,733	820	1,230	1,640	2,050	2,460	2,870	3,280	2,913	2,503	2,093	1,683	1,273	863	453
State Center	7,737	1,336	2,004	2,672	3,340	4,008	4,677	5,345	6,400	5,732	5,064	4,396	3,728	3,060	2,392
Ventura	5,431	1,405	2,108	2,811	3,514	4,216	4,919	5,622	4,026	3,323	2,620	1,917	1,215	512	0
Victor Valley	3,800	507	760	1,013	1,267	1,520	1,773	2,027	3,294	3,040	2,787	2,534	2,280	2,027	1,773
West Hills	559	126	189	252	315	378	441	504	433	370	307	244	181	118	55
West Kern	266	53	80	106	133	160	186	213	212	186	159	133	106	79	53
West Valley-Mission	2,756	953	1,430	1,906	2,383	2,859	3,336	3,812	1,802	1,326	849	373	0	0	0
Yosemite	6,068	1,038	1,557	2,076	2,595	3,114	3,633	4,152	5,030	4,511	3,992	3,473	2,954	2,435	1,916
Yuba	2,804	523	785	1,046	1,308	1,569	1,831	2,092	2,281	2,020	1,758	1,497	1,235	973	712
Totals	272,269	62,525	93,788	125,051	156,313	187,576	218,839	250,102	209,739	178,672	147,629	117,091	88,101	62,746	43,498

Table 16

Estimated Facilities Savings from Telecourses as a Stand Alone Policy

(Millions of 1991 Constant $s)

Percentage of 2005-06 Demand Served by Telecourses	5.00%	7.50%	10.00%	12.50%	15.00%	17.50%	20.00%
Unmet Demand	209,739	178,672	147,629	117,091	88,101	62,746	43,498
Unmet Demand: Existing Campuses	157,304	134,004	110,722	87,818	66,075	47,059	32,624
Unmet Demand: New Campuses	52,435	44,668	36,907	29,273	22,025	15,686	10,875
Cost : Existing campuses	$1,495.67	$1,274.13	$1,052.75	$834.98	$628.25	$447.44	$310.19
Cost : New campuses	$997.57	$849.81	$702.16	$556.91	$419.03	$298.43	$206.89
Total New Cost	$2,493.24	$2,123.93	$1,754.91	$1,391.89	$1,047.28	$745.88	$517.08
Cost with Business As Usual	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50
Savings	$743.26	$1,112.57	$1,481.59	$1,844.61	$2,189.22	$2,490.62	$2,719.42
Bond Retirement Interest Savings @ 6% for 20 years	$468.25	$700.92	$933.40	$1,162.10	$1,379.21	$1,569.09	$1,713.24
Total Savings	$1,211.51	$1,813.49	$2,414.99	$3,006.71	$3,568.43	$4,059.71	$4,432.66

For example, Table 16 shows that if ten percent of FTES are served through distance education, 147,629 FTES would remain unserved unless facilities were expanded and that the cost of such expansion would be $1.75 billion. If $1.75 billion is subtracted from the estimated $3.2 billion in facilities expansion costs through 2005, the resulting estimated savings from implementing distance education would be $1.48 billion. The bottom line shows that the total savings after accounting for debt retirement costs on the $1.4 billion saved would be $2.4 billion, assuming a 6 percent interest rate for 20-year facilities construction bonds.

Afternoon Scheduling (Recommendation III, Strategy 4, Action 3, page 98). Current State standards for community college facilities utilization assume that (1) community colleges schedule classes for 70 hours per week (8:00 a.m.-10:00 p.m., Monday through Friday), (2) colleges achieve a weekly room-hour utilization of 53 hours (i.e., classrooms are in use 76 percent of the time), and (3) 66 percent of classroom seats are filled when a classroom is in use. Assuming that colleges do fill 66 percent of available classroom seats, they can meet these standards by holding classes for an average of 10.6 hours per day (53 hours per week is 10.6 hours per day over five days). Thus, a college could meet the standard by holding classes from 8:00 a.m. to 2:00 p.m. and 5:00 p.m. to 10:00 p.m. for 11 of the theoretically available 14 hours. Community colleges that follow such a schedule could increase their capacity by scheduling additional courses during the afternoon hours from 2:00 p.m. to 5:00 p.m.

There are no system-wide data available showing when community colleges schedule classes or whether classrooms are available during the afternoon or some other block of time. A 1990 CPEC study found that practices vary widely from campus to campus. At most campuses, CPEC found a sharp drop in classroom utilization beginning at about 2:00 p.m. and a very steep drop after noon on Fridays.[27] In theory, scheduling classes during the 2:00 to 5:00 p.m. time frame could increase the number of FTES served by 27.27 percent (three currently unused hours divided by the current 11 hours used). In practice, the achievable increase is probably significantly less than the theoretical increase because some colleges already schedule afternoon classes or would be unable to do so successfully given the characteristics of their student population.

As shown in the following two tables, the Commission estimated the potential facilities savings from implementing afternoon scheduling using a methodology similar to the one used to estimate potential savings from implementing distance education.

These estimates differ in one important respect from both the telecourse model described above and the year-round operations model described below. Both of these models assume that no additional support facilities are needed, on the assumption that students educated at a distance do not place a burden on campus facilities and that year-round operations simply increase the amount of time that facilities are used. Afternoon scheduling, in contrast, may generate additional support facilities needs if "new" afternoon students make use of support facilities during non-afternoon hours when other students are also using those facilities. Thus, the afternoon scheduling model assumes that bringing additional students on campus during afternoon hours

[27]California Postsecondary Education Commission, op. cit.

will increase classroom facility capacity, but that some marginal additions to support facilities (libraries, administrative offices, shops, etc.) would be needed to accommodate their presence. The Commission assumed that at existing campuses, 30 percent of the total per-FTES facility cost would have to be devoted to the construction of additional support facilities for new afternoon students. At new centers or campuses making full use of afternoon hours, the Commission assumed that additional support facilities would cost 55 percent of the total per-FTES facility cost.[28]

Table 17 shows the total estimated number of FTES that could be served at each campus if afternoon scheduling were implemented to serve various percentages of FTES (ranging from 9 to 22 percent). The table also shows the estimated unmet demand in each district if afternoon scheduling were to be implemented as a stand-alone policy (without distance education or year-round operations). Table 18 shows the estimated facilities savings at varying levels of implementation, including costs for additional support facilities that may be needed to accommodate students during the afternoon. The table sums the costs for accommodating demand met through afternoon scheduling with the costs of serving demand remaining after implementing afternoon scheduling, and subtracts these costs from the estimated $3.2 billion in total facilities needs to yield savings figures, with and without debt retirement costs.

Year-round Operations (Recommendation 3, Strategy 4, Action 4, page 99). There are myriad possible arrangements for extending use of community college facilities to a year-round basis. Several of these options were explored and discussed in Policy Discussion Paper #4 and include:

- moving to a quarter system and having students attend four 11-12 week quarters throughout the year;
- offering three 15-16 week trimesters in lieu of the current two 18 week semesters; and
- so-called "multi-track" calendars used extensively in K-12 schools that use a variety of trimester and quarter schedules where facilities are nearly constantly in use, but students and instructors shift in and out of the facility on program tracks and are in attendance the same amount of time as in traditional calendars.[29]

The Commission's cost and savings estimates for its year-round operations recommendation are based on adding a third semester to the current community college schedule—an approach that would be most compatible with the current system and would likely be the most easy to

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[28]Estimates of the marginal additions to support facilities needed to support new afternoon students were made with the assistance of Chancellor's Office facilities planning staff. The 30 and 55 percent assumptions were made on the basis of these estimates, together with data showing ratios of classroom to non-classroom square footage at existing campuses (in California Community Colleges, Chancellor's Office, *Statewide Room Use Summary Report 17*. Sacramento, CA: December 1992), and data showing differences in construction costs per square foot for classroom and other facilities (in SARA Systems Inc., "Building Unit Cost Guidelines: Cost Index ENR 5247." Canutillo, TX: October 1992).

[29]Commission on Innovation, *Reducing the Need for New Facilities through Fuller Use of Existing Facilities*, Policy Discussion Paper #4, September 1992. Berkeley, CA: BW Associates, WP-113, 1992.

Table 17

Estimated Demand for Facilities

(Afternoon Scheduling as a Stand Alone Policy)

		Assumed Percentage Increase in 1992 Capacity with Afternoon Scheduling												
		21.82%	19.64%	17.45%	15.27%	13.09%	10.91%	8.73%	21.82%	19.64%	17.45%	15.27%	13.09%	10.91%	8.73%
	Remaining Demand	New District Capacity based on 1992-93 with Afternoon Scheduling							Unmet FTES Demand in 2005-06						
Allan Hancock	2,620	10,392	10,205	10,019	9,833	9,647	9,461	9,275	758	944	1,131	1,317	1,503	1,689	1,875
Antelope Valley	5,604	9,651	9,478	9,305	9,132	8,959	8,786	8,614	3,875	4,048	4,221	4,394	4,567	4,739	4,912
Barstow	478	2,098	2,060	2,022	1,985	1,947	1,910	1,872	102	140	177	215	253	290	328
Butte	3,531	13,038	12,804	12,570	12,337	12,103	11,870	11,636	1,196	1,430	1,663	1,897	2,130	2,364	2,597
Cabrillo	2,607	13,066	12,832	12,598	12,364	12,130	11,896	11,662	267	501	735	969	1,203	1,437	1,671
Cerritos	3,455	18,397	18,067	17,738	17,408	17,079	16,749	16,420	160	489	819	1,148	1,478	1,807	2,137
Chaffey	5,139	14,404	14,146	13,888	13,630	13,372	13,114	12,856	2,556	2,814	3,072	3,329	3,587	3,845	4,103
Citrus	1,789	11,123	10,924	10,724	10,525	10,326	10,127	9,927	0	0	196	395	594	793	993
Coast	6,269	44,741	43,940	43,139	42,337	41,536	40,735	39,933	0	0	0	660	1,461	2,263	3,064
Compton	817	5,071	4,980	4,889	4,798	4,707	4,617	4,526	0	0	90	181	272	363	454
Contra Costa	8,020	39,170	38,469	37,767	37,066	36,364	35,662	34,961	1,010	1,712	2,413	3,115	3,816	4,518	5,219
Desert	3,203	9,728	9,553	9,379	9,205	9,031	8,856	8,682	1,461	1,635	1,809	1,984	2,158	2,332	2,506
El Camino	3,907	23,631	23,208	22,785	22,361	21,938	21,515	21,092	0	93	516	939	1,362	1,786	2,209
Feather River	225	1,001	983	965	947	929	911	893	46	64	81	99	117	135	153
Foothill	4,982	42,028	41,275	40,522	39,770	39,017	38,264	37,512	0	0	0	0	465	1,218	1,971
Fremont-Newark	1,533	8,785	8,627	8,470	8,313	8,155	7,998	7,841	0	117	274	431	589	746	903
Gavilan	1,256	5,581	5,481	5,381	5,281	5,181	5,081	4,981	257	357	457	557	656	756	856
Glendale	3,567	16,011	15,724	15,437	15,150	14,864	14,577	14,290	699	986	1,273	1,560	1,846	2,133	2,420
Grossmont	4,320	21,428	21,044	20,660	20,276	19,893	19,509	19,125	483	866	1,250	1,634	2,018	2,402	2,785
Hartnell	1,736	7,582	7,446	7,310	7,175	7,039	6,903	6,767	378	514	650	786	921	1,057	1,193
Imperial	1,750	6,379	6,265	6,151	6,036	5,922	5,808	5,694	607	722	836	950	1,064	1,179	1,293
Kern	5,049	18,291	17,963	17,636	17,308	16,981	16,653	16,325	1,773	2,101	2,428	2,756	3,084	3,411	3,739
Lake Tahoe	534	1,616	1,588	1,559	1,530	1,501	1,472	1,443	244	273	302	331	360	389	418
Lassen	624	3,579	3,515	3,451	3,387	3,323	3,259	3,195	0	47	112	176	240	304	368
Long Beach	4,469	24,516	24,077	23,638	23,199	22,760	22,321	21,882	78	517	956	1,395	1,834	2,273	2,713
Los Angeles	17,090	104,021	102,158	100,295	98,432	96,569	94,706	92,843	0	322	2,185	4,048	5,912	7,775	9,638
Los Rios	12,953	48,417	47,550	46,682	45,815	44,948	44,081	43,214	4,282	5,149	6,016	6,883	7,750	8,618	9,485
Marin	463	11,017	10,820	10,622	10,425	10,228	10,030	9,833	0	0	0	0	0	0	0
Mendocino	771	3,098	3,043	2,987	2,932	2,876	2,821	2,765	216	272	327	383	438	494	549
Merced	3,787	10,632	10,442	10,251	10,061	9,870	9,680	9,490	1,882	2,073	2,263	2,454	2,644	2,834	3,025
Mira Costa	2,838	10,228	10,045	9,862	9,678	9,495	9,312	9,129	1,006	1,189	1,372	1,555	1,739	1,922	2,105
Monterey	1,493	8,756	8,599	8,442	8,285	8,129	7,972	7,815	0	82	239	395	552	709	866
Mt San Antonio	6,195	27,076	26,591	26,106	25,621	25,136	24,651	24,166	1,346	1,831	2,316	2,800	3,285	3,770	4,255
Mt. San Jacinto	2,979	5,715	5,613	5,511	5,408	5,306	5,204	5,101	1,955	2,057	2,160	2,262	2,364	2,467	2,569
Napa	1,410	7,053	6,926	6,800	6,674	6,547	6,421	6,295	146	273	399	525	652	778	904
North Orange	5,848	42,307	41,549	40,792	40,034	39,276	38,518	37,761	0	0	0	544	1,301	2,059	2,817

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Table 17 (Cont.)

		Assumed Percentage Increase in 1992 Capacity with Afternoon Scheduling													
		21.82%	19.64%	17.45%	15.27%	13.09%	10.91%	8.73%	21.82%	19.64%	17.45%	15.27%	13.09%	10.91%	8.73%
	Remaining Demand	New District Capacity based on 1992-93 with Afternoon Scheduling							Unmet FTES Demand in 2005-06						
Palo Verde	204	1,030	1,011	993	974	956	937	919	19	38	56	75	93	112	130
Palomar	6,881	20,706	20,335	19,964	19,594	19,223	18,852	18,481	3,172	3,543	3,914	4,285	4,656	5,027	5,397
Pasadena	4,252	26,142	25,674	25,206	24,738	24,269	23,801	23,333	0	38	506	974	1,443	1,911	2,379
Peralta	3,676	22,881	22,471	22,061	21,651	21,241	20,832	20,422	0	0	398	808	1,217	1,627	2,037
Rancho Santiago	4,581	31,434	30,871	30,308	29,745	29,182	28,619	28,056	0	0	77	640	1,203	1,766	2,329
Redwoods	1,671	7,765	7,626	7,487	7,348	7,208	7,069	6,930	280	419	558	697	836	976	1,115
Rio Hondo	2,463	14,769	14,505	14,240	13,976	13,711	13,447	13,182	0	83	347	612	876	1,141	1,405
Riverside	6,731	20,610	20,241	19,872	19,502	19,133	18,764	18,395	3,040	3,409	3,778	4,147	4,516	4,886	5,255
Saddleback	7,212	27,220	26,732	26,245	25,757	25,270	24,782	24,295	2,337	2,825	3,312	3,800	4,287	4,775	5,262
San Bernadino	5,588	18,156	17,831	17,506	17,181	16,856	16,530	16,205	2,336	2,661	2,986	3,311	3,637	3,962	4,287
San Diego	10,389	55,547	54,552	53,557	52,562	51,567	50,572	49,577	436	1,431	2,426	3,421	4,415	5,410	6,405
San Francisco	4,863	50,332	49,430	48,529	47,627	46,726	45,824	44,923	0	0	0	0	0	356	1,257
San Joaquin	6,086	19,686	19,334	18,981	18,628	18,276	17,923	17,571	2,560	2,913	3,265	3,618	3,970	4,323	4,676
San Jose	2,497	19,677	19,324	18,972	18,619	18,267	17,914	17,562	0	0	0	30	382	735	1,087
San Luis Obispo	2,731	8,775	8,618	8,461	8,304	8,146	7,989	7,832	1,159	1,316	1,473	1,631	1,788	1,945	2,102
Sam Mateo	3,278	26,479	26,005	25,531	25,056	24,582	24,108	23,634	0	0	0	0	432	906	1,381
Santa Barbara	2,330	16,396	16,102	15,808	15,515	15,221	14,927	14,634	0	0	0	274	568	862	1,155
Santta Clarita	4,008	6,456	6,341	6,225	6,109	5,994	5,878	5,762	2,851	2,967	3,083	3,198	3,314	3,430	3,545
Santa Monica	3,591	20,100	19,740	19,380	19,020	18,660	18,300	17,940	0	351	711	1,071	1,431	1,791	2,151
Sequoias	3,015	9,756	9,582	9,407	9,232	9,058	8,883	8,708	1,268	1,443	1,617	1,792	1,967	2,141	2,316
Shasta	2,468	9,997	9,818	9,639	9,460	9,281	9,102	8,923	677	856	1,035	1,214	1,393	1,572	1,752
Sierra	4,344	13,182	12,946	12,710	12,474	12,237	12,001	11,765	1,983	2,219	2,455	2,691	2,927	3,163	3,400
Siskiyou	630	3,012	2,958	2,904	2,850	2,796	2,742	2,688	90	144	198	252	306	360	414
Solano	3,601	11,104	10,905	10,706	10,507	10,308	10,109	9,910	1,613	1,812	2,011	2,209	2,408	2,607	2,806
Sonoma	5,075	23,198	22,783	22,367	21,952	21,536	21,121	20,705	921	1,336	1,751	2,167	2,582	2,998	3,413
South County	3,644	18,647	18,313	17,979	17,645	17,311	16,977	16,643	304	638	972	1,306	1,640	1,974	2,308
Southwestern	3,733	16,655	16,357	16,059	15,760	15,462	15,164	14,865	750	1,048	1,347	1,645	1,943	2,242	2,540
State Center	7,737	24,872	24,427	23,981	23,536	23,090	22,645	22,199	3,282	3,727	4,173	4,618	5,064	5,509	5,955
Ventura	5,431	29,866	29,331	28,796	28,261	27,726	27,191	26,657	82	617	1,152	1,687	2,222	2,756	3,291
Victor Valley	3,800	8,246	8,098	7,950	7,803	7,655	7,507	7,360	2,323	2,471	2,619	2,766	2,914	3,062	3,209
West Hills	559	2,579	2,532	2,486	2,440	2,394	2,348	2,302	97	143	189	236	282	328	374
West Kern	266	1,049	1,030	1,011	992	974	955	936	78	96	115	134	153	172	190
West Valley-Mission	2,756	21,524	21,138	20,753	20,367	19,982	19,596	19,211	0	0	0	57	443	828	1,214
Yosemite	6,068	19,244	18,899	18,554	18,210	17,865	17,520	17,176	2,621	2,966	3,311	3,655	4,000	4,345	4,689
Yuba	2,804	10,045	9,865	9,685	9,505	9,325	9,146	8,966	1,005	1,185	1,365	1,545	1,725	1,905	2,085
Totals	272,265	1,286,759	1,263,713	1,240,666	1,217,620	1,194,574	1,171,527	1,148,481	62,069	76,311	93,940	113,634	135,252	157,556	180,405

Table 18

Estimated Facilities Savings from Afternoon Scheduling as a Stand Alone Policy

(Millions of 1991 Constant $s)

Assumed 1992-93 Capacity Increase	**21.82%**	**19.64%**	**17.45%**	**15.27%**	**13.09%**	**10.91%**	**8.73%**
Unmet Demand	**62,069**	**76,311**	**93,940**	**113,634**	**135,252**	**157,556**	**180,405**
Unmet Demand: Existing Campuses	46,552	57,234	70,455	85,226	101,439	118,167	135,304
Unmet Demand: New Campuses	15,517	19,078	23,485	28,409	33,813	39,389	45,101
Met Demand	**210,196**	**195,953**	**178,325**	**158,630**	**137,012**	**114,709**	**91,860**
Met Demand: Existing Campuses	157,647	146,965	133,744	118,973	102,759	86,032	68,895
Met Demand: New Campuses	52,549	48,988	44,581	39,658	34,253	28,677	22,965
Cost of Unmet Demand : Existing campuses	$442.62	$544.18	$669.89	$810.34	$964.50	$1,123.55	$1,286.48
Cost of Unmet Demand: New campuses	$295.22	$362.96	$446.80	$540.47	$643.29	$749.37	$858.05
Cost of Met Demand : Existing campuses	$440.49	$410.64	$373.70	$332.43	$287.13	$240.39	$192.50
Cost of Met Demand: New campuses	$545.11	$508.18	$462.46	$411.38	$355.32	$297.48	$238.22
Total New Cost	$1,723.44	$1,825.96	$1,952.85	$2,094.62	$2,250.24	$2,410.79	$2,575.26
Cost with Business As Usual	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50
Savings	**$1,513.06**	**$1,410.54**	**$1,283.65**	**$1,141.88**	**$986.26**	**$825.71**	**$661.24**
Bond Retirement Interest Savings @ 6% for 20 years	$953.23	$888.64	$808.70	$719.38	$621.35	$520.20	$416.58
Total Savings	$2,466.29	$2,299.18	$2,092.35	$1,861.26	$1,607.61	$1,345.92	$1,077.82

implement. By adding a third semester to community colleges schedules, year-round education could in theory increase system facilities capacity by up to 50 percent. However, summer enrollment at community colleges already accounts for an estimated 10 percent of annual FTES. Thus, the actual maximum potential increase is only 35 percent.[30]

The Commission estimated the potential facilities savings resulting from implementing year-round operations in a model that parallels the telecourse model described above. Table 19 shows the potential for serving additional students on a district-by-district basis and the resulting unmet demand under varying levels of assumed increase in capacity ranging from 14 to 35 percent. Table 20 shows the corresponding levels of possible savings.

COMBINED FACILITIES MODEL

The facilities models discussed above show how each of three strategies could reduce the need for constructing new facilities when they are implemented as *stand-alone* changes. In order to obtain a more realistic estimate of the potential for achieving facilities savings, however, it is essential to model these strategies when implemented together in a combined fashion. Some districts, for example, may be able to accommodate all growth by implementing only one of the recommended strategies (e.g., distance education). Implementing additional strategies in such a district (e.g., afternoon scheduling) would be unnecessary and would only generate "paper" savings. Other districts may need to implement two or three strategies to accommodate anticipated growth, while others will be unable to accommodate growth even by implementing all three strategies.

To obtain a more realistic estimate of the potential for the three strategies to generate facilities savings, several models were created to generate district-by-district savings estimates when the three strategies are implemented in a combined fashion. In theory, the three facilities strategies could be implemented in any of six different sequences. The model used by the Commission to estimate potential savings assumes that districts first accommodate additional enrollment demand through distance education; that remaining demand is then served by implementing afternoon course scheduling; and that if any demand remains it is accommodated, if possible, through year-round operations.

Table 21 shows the estimated numbers of FTES served when implementing facilities strategies in the sequence described above, together with associated estimated savings. The table shows district-specific estimates of the expected net increase in FTES demand (from Table 13, above), and the number of FTES that could be served by the three strategies under the assumption of a combined model. **The facilities savings estimates in Table 2 (page 108) of *Choosing the***

[30]If current capacity at 100 percent is increased to the "theoretical" 150 percent by adding a third semester, then multiplied by 0.9 to account for 10 percent of FTES currently enrolled in summer courses, the result is 135 percent -- a 35 percent maximum potential increase.

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Table 19

Estimated Demand for Facilities

(Year-round Operations as a Stand Alone Policy)

		Assumed Percentage Increase in 1992 Capacity with Year-Round Operations													
		35.00%	31.50%	28.00%	24.50%	21.00%	17.50%	14.00%	35.00%	31.50%	28.00%	24.50%	21.00%	17.50%	14.00%
	Remaining Demand	New District Capacity based on 1992-93 with Year-Round Operations							Unmet FTES Demand in 2005-06						
Allan Hancock	2,620	11,516	11,217	10,919	10,620	10,322	10,023	9,725	0	0	231	530	828	1,127	1,425
Antelope Valley	5,604	10,695	10,418	10,140	9,863	9,586	9,309	9,031	2,831	3,108	3,386	3,663	3,940	4,217	4,495
Barstow	478	2,325	2,264	2,204	2,144	2,083	2,023	1,963	0	0	0	56	116	177	237
Butte	3,531	14,448	14,074	13,699	13,325	12,950	12,575	12,201	0	160	535	909	1,284	1,658	2,033
Cabrillo	2,607	14,480	14,105	13,729	13,354	12,979	12,603	12,228	0	0	0	0	355	730	1,106
Cerritos	3,459	20,388	19,859	19,330	18,802	18,273	17,745	17,216	0	0	0	0	283	812	1,340
Chaffey	5,139	15,962	15,549	15,135	14,721	14,307	13,893	13,479	997	1,411	1,825	2,238	2,652	3,066	3,480
Citrus	1,789	12,326	12,007	11,687	11,368	11,048	10,729	10,409	0	0	0	0	0	192	511
Coast	6,269	49,583	48,297	47,012	45,726	44,441	43,155	41,870	0	0	0	0	0	0	1,127
Compton	817	5,619	5,474	5,328	5,182	5,037	4,891	4,745	0	0	0	0	0	89	234
Contra Costa	8,020	43,409	42,283	41,158	40,033	38,907	37,782	36,656	0	0	0	148	1,273	2,398	3,524
Desert	3,203	10,780	10,501	10,221	9,942	9,662	9,383	9,103	408	688	967	1,247	1,526	1,806	2,085
El Camino	3,907	26,188	25,509	24,830	24,151	23,472	22,793	22,114	0	0	0	0	0	507	1,186
Feather River	225	1,109	1,080	1,051	1,023	994	965	936	0	0	0	24	52	81	110
Foothill	4,982	46,576	45,368	44,161	42,953	41,746	40,538	39,331	0	0	0	0	0	0	152
Fremont-Newark	1,533	9,735	9,483	9,230	8,978	8,726	8,473	8,221	0	0	0	0	18	271	523
Gavilan	1,256	6,185	6,024	5,864	5,703	5,543	5,383	5,222	0	0	0	134	294	454	615
Glendale	3,567	17,743	17,283	16,823	16,363	15,903	15,443	14,983	0	0	0	347	807	1,267	1,727
Grossmont	4,320	23,746	23,131	22,515	21,899	21,284	20,668	20,052	0	0	0	11	627	1,242	1,858
Hartnell	1,736	8,402	8,185	7,967	7,749	7,531	7,313	7,095	0	0	0	211	429	647	865
Imperial	1,750	7,070	6,886	6,703	6,520	6,336	6,153	5,970	0	100	284	467	650	834	1,017
Kern	5,049	20,270	19,745	19,219	18,694	18,168	17,643	17,117	0	320	845	1,371	1,896	2,422	2,947
Lake Tahoe	534	1,791	1,745	1,698	1,652	1,606	1,559	1,513	69	116	162	208	255	301	348
Lassen	624	3,967	3,864	3,761	3,658	3,555	3,452	3,350	0	0	0	0	7	110	213
Long Beach	4,469	27,169	26,465	25,760	25,056	24,352	23,647	22,943	0	0	0	0	243	947	1,651
Los Angeles	17,090	115,277	112,288	109,300	106,311	103,322	100,334	97,345	0	0	0	0	0	2,147	5,135
Los Rios	12,953	53,656	52,265	50,874	49,483	48,092	46,701	45,309	0	434	1,825	3,216	4,607	5,998	7,389
Marin	463	12,209	11,893	11,576	11,259	10,943	10,626	10,310	0	0	0	0	0	0	0
Mendocino	771	3,433	3,344	3,255	3,166	3,077	2,988	2,899	0	0	59	148	237	326	415
Merced	3,787	11,783	11,477	11,172	10,866	10,561	10,255	9,950	732	1,037	1,343	1,648	1,954	2,259	2,565
Mira Costa	2,838	11,335	11,041	10,747	10,453	10,159	9,865	9,572	0	193	487	781	1,074	1,368	1,662
Monterey	1,493	9,703	9,452	9,200	8,949	8,697	8,445	8,194	0	0	0	0	0	235	487
Mt San Antonio	6,195	30,006	29,228	28,450	27,672	26,894	26,116	25,338	0	0	0	750	1,528	2,305	3,083
Mt. San Jacinto	2,979	6,334	6,170	6,005	5,841	5,677	5,513	5,349	1,336	1,501	1,665	1,829	1,993	2,158	2,322
Napa	1,410	7,816	7,613	7,411	7,208	7,005	6,803	6,600	0	0	0	0	194	396	599
North Orange	5,848	46,885	45,669	44,454	43,238	42,023	40,807	39,592	0	0	0	0	0	0	986

Table 19 (Cont.)

		Assumed Percentage Increase in 1992 Capacity with Year-Round Operations												
		35.00%	31.50%	28.00%	24.50%	21.00%	17.50%	14.00%	35.00%	31.50%	28.00%	24.50%	21.00%	17.50%	14.00%
	Remaining Demand	New District Capacity based on 1992-93 with Year-Round Operations							Unmet FTES Demand in 2005-06						
Palo Verde	204	1,141	1,111	1,082	1,052	1,023	993	963	0	0	0	0	26	56	85
Palomar	6,881	22,947	22,352	21,757	21,162	20,567	19,972	19,377	932	1,527	2,122	2,717	3,311	3,906	4,501
Pasadena	4,252	28,971	28,220	27,469	26,718	25,967	25,216	24,465	0	0	0	0	0	496	1,248
Peralta	3,676	25,356	24,699	24,042	23,384	22,727	22,070	21,412	0	0	0	0	0	389	1,047
Rancho Santiago	4,581	34,836	33,933	33,030	32,126	31,223	30,320	29,417	0	0	0	0	0	65	968
Redwoods	1,671	8,605	8,382	8,159	7,936	7,713	7,490	7,266	0	0	0	109	332	555	779
Rio Hondo	2,463	16,368	15,943	15,519	15,095	14,670	14,246	13,822	0	0	0	0	0	342	766
Riverside	6,731	22,840	22,248	21,656	21,064	20,471	19,879	19,287	810	1,402	1,994	2,586	3,178	3,770	4,363
Saddleback	7,212	30,165	29,383	28,601	27,819	27,037	26,255	25,473	0	174	956	1,738	2,520	3,302	4,084
San Bernadino	5,588	20,121	19,599	19,078	18,556	18,034	17,513	16,991	371	893	1,415	1,936	2,458	2,979	3,501
San Diego	10,385	61,557	59,961	58,365	56,769	55,173	53,578	51,982	0	0	0	0	809	2,405	4,001
San Francisco	4,863	55,778	54,332	52,886	51,440	49,993	48,547	47,101	0	0	0	0	0	0	0
San Joaquin	6,086	21,816	21,251	20,685	20,120	19,554	18,988	18,423	430	995	1,561	2,127	2,692	3,258	3,824
San Jose	2,497	21,806	21,240	20,675	20,110	19,544	18,979	18,414	0	0	0	0	0	0	236
San Luis Obispo	2,731	9,725	9,472	9,220	8,968	8,716	8,464	8,212	210	462	714	966	1,218	1,470	1,722
Sam Mateo	3,278	29,344	28,584	27,823	27,062	26,301	25,541	24,780	0	0	0	0	0	0	234
Santa Barbara	2,330	18,170	17,699	17,228	16,756	16,285	15,814	15,343	0	0	0	0	0	0	446
Santta Clarita	4,008	7,155	6,969	6,784	6,598	6,413	6,227	6,042	2,153	2,338	2,524	2,709	2,895	3,080	3,266
Santa Monica	3,591	22,275	21,697	21,120	20,542	19,965	19,387	18,810	0	0	0	0	126	704	1,281
Sequoias	3,015	10,812	10,532	10,252	9,971	9,691	9,411	9,130	212	492	773	1,053	1,333	1,614	1,894
Shasta	2,468	11,079	10,792	10,504	10,217	9,930	9,643	9,355	0	0	170	457	744	1,032	1,319
Sierra	4,344	14,608	14,230	13,851	13,472	13,093	12,715	12,336	557	935	1,314	1,693	2,071	2,450	2,829
Siskiyou	630	3,338	3,251	3,164	3,078	2,991	2,905	2,818	0	0	0	24	110	197	283
Solano	3,601	12,305	11,986	11,667	11,348	11,029	10,710	10,391	411	730	1,049	1,368	1,687	2,006	2,325
Sonoma	5,075	25,708	25,042	24,375	23,709	23,042	22,376	21,709	0	0	0	410	1,076	1,743	2,409
South County	3,644	20,665	20,129	19,593	19,058	18,522	17,986	17,450	0	0	0	0	429	965	1,501
Southwestern	3,733	18,458	17,979	17,500	17,022	16,543	16,065	15,586	0	0	0	383	862	1,341	1,819
State Center	7,737	27,564	26,849	26,134	25,420	24,705	23,991	23,276	590	1,305	2,020	2,734	3,449	4,164	4,878
Ventura	5,431	33,098	32,240	31,382	30,524	29,665	28,807	27,949	0	0	0	0	282	1,141	1,999
Victor Valley	3,800	9,138	8,901	8,664	8,427	8,190	7,954	7,717	1,431	1,668	1,905	2,142	2,379	2,616	2,853
West Hills	559	2,858	2,784	2,709	2,635	2,561	2,487	2,413	0	0	0	40	114	188	263
West Kern	266	1,162	1,132	1,102	1,072	1,042	1,012	981	0	0	24	55	85	115	145
West Valley-Mission	2,756	23,853	23,235	22,616	21,998	21,379	20,761	20,143	0	0	0	0	0	0	282
Yosemite	6,068	21,326	20,773	20,220	19,667	19,114	18,561	18,009	539	1,092	1,645	2,198	2,751	3,303	3,856
Yuba	2,804	11,132	10,844	10,555	10,266	9,978	9,689	9,400	0	207	495	784	1,073	1,361	1,650
Totals	272,265	1,425,998	1,389,028	1,352,058	1,315,087	1,278,117	1,241,147	1,204,176	15,019	23,288	34,292	48,164	67,137	93,562	126,108

Table 20

Estimated Facilities Savings from Year-round Operations as a Stand Alone Policy

(Millions of 1991 Constant $s)

Assumed 1992-93 Capacity Increase	35.00%	31.50%	28.00%	24.50%	21.00%	17.50%	14.00%
Unmet Demand	15,019	23,288	34,292	48,164	67,137	93,562	126,108
Unmet Demand: Existing Campuses	11,264	17,466	25,719	36,123	50,353	70,171	94,581
Unmet Demand: New Campuses	3,755	5,822	8,573	12,041	16,784	23,390	31,527
Cost : Existing campuses	$107.10	$166.07	$244.54	$343.46	$478.76	$667.20	$899.28
Cost : New campuses	$71.43	$110.76	$163.10	$229.08	$319.32	$445.00	$599.80
Total New Cost	$178.54	$276.83	$407.64	$572.54	$798.08	$1,112.20	$1,499.08
Cost with Business As Usual	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50	$3,236.50
Savings	$3,057.96	$2,959.67	$2,828.86	$2,663.96	$2,438.42	$2,124.30	$1,737.42
Bond Retirement Interest Savings @ 6% for 20 years	$1,926.52	$1,864.59	$1,782.18	$1,678.30	$1,536.20	$1,338.31	$1,094.57
Total Savings	$4,984.48	$4,824.27	$4,611.04	$4,342.26	$3,974.62	$3,462.61	$2,831.99

Table 21

Estimated Demand for Facilities

(Telecourses, Afternoon Scheduling and Year-round Operations as Combined Policy)

	Net FTES Increase 1992-2005	FTES Demand met by Pipiline $'s	Remaining FTES Demand	Demand satisfied by Telecourse (20%of 2005 credit FTES)	Remaining Demand	Remaining Demand Satisfied by Afternoon Scheduling(10.91%)	Remaining Demand	Remaining Demand met by YRO (17.50%)	Unmet FTES Demand
Allan Hancock	2,943	324	2,620	2,107	513	931	0	1,493	0
Antelope Valley	6,296	693	5,604	2,611	2,993	864	2,129	1,386	743
Barstow	537	59	478	415	63	188	0	301	0
Butte	3,968	436	3,531	2,693	838	1,168	0	1,873	0
Cabrillo	2,930	322	2,607	2,507	100	1,170	0	1,877	0
Cerritos	3,882	427	3,455	3,485	0	1,647	0	2,643	0
Chaffey	5,770	635	5,135	3,230	1,905	1,290	615	2,069	0
Citrus	2,011	221	1,789	2,046	0	996	0	1,598	0
Coast	7,044	775	6,269	8,037	0	4,007	0	6,427	0
Compton	918	101	817	933	0	454	0	728	0
Contra Costa	9,017	992	8,026	7,559	466	3,508	0	5,627	0
Desert	3,599	396	3,203	2,127	1,076	871	205	1,397	0
El Camino	4,384	482	3,902	4,366	0	2,116	0	3,395	0
Feather River	253	28	225	197	28	90	0	144	0
Foothill	5,598	616	4,982	7,362	0	3,764	0	6,038	0
Fremont-Newark	1,722	189	1,533	1,640	0	787	0	1,262	0
Gavilan	1,411	155	1,256	1,100	156	500	0	802	0
Glendale	4,008	441	3,567	3,149	418	1,434	0	2,300	0
Grossmont	4,854	534	4,320	4,121	200	1,919	0	3,078	0
Hartnell	1,951	215	1,736	1,501	235	679	0	1,089	0
Imperial	1,966	216	1,750	1,322	428	571	0	916	0
Kern	5,673	624	5,049	3,798	1,251	1,638	0	2,628	0
Lake Tahoe	600	66	534	354	180	145	35	232	0
Lassen	702	77	624	668	0	321	0	514	0
Long Beach	5,021	552	4,469	4,617	0	2,195	0	3,522	0
Los Angeles	19,202	2,112	17,090	19,203	0	9,315	0	14,943	0
Los Rios	14,554	1,601	12,953	9,969	2,984	4,336	0	6,955	0
Marin	520	57	463	1,756	0	987	0	1,583	0
Mendocino	866	95	771	626	145	277	0	445	0
Merced	4,255	468	3,787	2,384	1,403	952	451	1,527	0
Mira Costa	3,188	351	2,838	2,127	711	916	0	1,469	0
Monterey	1,678	185	1,493	1,628	0	784	0	1,258	0
Mt San Antonio	6,961	766	6,195	5,359	836	2,425	0	3,890	0
Mt. San Jacinto	3,347	368	2,979	1,476	1,503	512	991	821	170
Napa	1,584	174	1,410	1,354	56	632	0	1,013	0
North Orange	6,570	723	5,848	7,583	0	3,789	0	6,078	0

Table 21 (Cont.)

	Net FTES Increase 1992-2005	FTES Demand met by Pipiline $'s	Remaining FTES Demand	Demand satisfied by Telecourse (20%of 2005 credit FTES)	Remaining Demand	Remaining Demand Satisfied by Afternoon Scheduling(10.91%)	Remaining Demand	Remaining Demand met by YRO (17.50%)	Unmet FTES Demand
Palo Verde	229	25	204	197	7	92	0	148	0
Palomar	7,731	850	6,881	4,540	2,341	1,854	486	2,975	0
Pasadena	4,777	526	4,252	4,817	0	2,341	0	3,756	0
Peralta	4,131	454	3,676	4,207	0	2,049	0	3,287	0
Rancho Santiago	5,147	566	4,581	5,683	0	2,815	0	4,516	0
Redwoods	1,877	207	1,671	1,515	156	695	0	1,115	0
Rio Hondo	2,768	304	2,463	2,734	0	1,323	0	2,122	0
Riverside	7,563	832	6,731	4,495	2,236	1,846	391	2,961	0
Saddleback	8,104	891	7,212	5,590	1,622	2,438	0	3,910	0
San Bernadino	6,278	691	5,588	3,889	1,699	1,626	73	2,608	0
San Diego	11,668	1,283	10,385	10,514	0	4,974	0	7,980	0
San Francisco	5,464	601	4,863	8,589	0	4,507	0	7,230	0
San Joaquin	6,838	752	6,086	4,223	1,863	1,763	101	2,828	0
San Jose	2,806	309	2,497	3,481	0	1,762	0	2,827	0
San Luis Obispo	3,068	338	2,731	1,886	845	786	59	1,261	0
Sam Mateo	3,683	405	3,278	4,667	0	2,371	0	3,804	0
Santa Barbara	2,618	288	2,330	2,952	0	1,468	0	2,355	0
Santta Clarita	4,503	495	4,008	1,800	2,208	578	1,630	927	702
Santa Monica	4,035	444	3,591	3,770	0	1,800	0	2,887	0
Sequoias	3,388	373	3,015	2,092	923	874	49	1,402	0
Shasta	2,773	305	2,468	2,016	452	895	0	1,436	0
Sierra	4,881	537	4,344	2,883	1,461	1,180	281	1,894	0
Siskiyou	707	78	630	584	46	270	0	433	0
Solano	4,047	445	3,601	2,416	1,185	994	191	1,595	0
Sonoma	5,703	627	5,075	4,543	532	2,077	0	3,333	0
South County	4,094	450	3,644	3,562	82	1,670	0	2,679	0
Southwestern	4,195	461	3,733	3,280	453	1,492	0	2,393	0
State Center	8,693	956	7,737	5,345	2,392	2,227	165	3,573	0
Ventura	6,102	671	5,431	5,622	0	2,675	0	4,290	0
Victor Valley	4,270	470	3,800	2,027	1,773	738	1,035	1,185	0
West Hills	628	69	559	504	55	231	0	370	0
West Kern	298	33	266	213	53	94	0	151	0
West Valley-Mission	3,096	341	2,756	3,812	0	1,928	0	3,092	0
Yosemite	6,818	750	6,068	4,152	1,916	1,723	193	2,764	0
Yuba	3,151	347	2,804	2,092	712	900	0	1,443	0
Totals	305,914	33,649	272,265	250,102	43,498	115,232	9,078	184,852	1,615

***Future* are based on this combined model, not the estimates generated in the stand-alone models described above.**

Distance education—combined model. The Commission's combined facilities model assumes that 20 percent of community colleges' FTES will be enrolled in telecourses by the year 2005. Though this is an aggressive target, the Commission believes that the target is achievable.[31] If the 20 percent goal is reached, Table 21 shows that an estimated 250,102 FTES worth of demand could be satisfied while avoiding extensive facilities expenditures, and that the estimated remaining unserved demand would drop to 43,498 FTES.

Afternoon scheduling—combined model. The Commission evaluated the practical considerations of implementing afternoon scheduling in consultation with community college experts from across the state. Based on these discussions, the Commission's estimates assume that afternoon scheduling would increase capacity by 10.91 percent, rather than the theoretical 27 percent. This reflects further assumptions that (1) afternoon scheduling could only be used four days per week rather than the normal five day week and (2) that only 50 percent of the remaining theoretical increase in capacity is actually attainable due to the fact that many colleges already maximize their facility use during the afternoons or that other circumstances make such schedules impractical. If afternoon scheduling leads to a 10.91 percent increase in capacity, Table 21 shows that the estimated 43,498 unhoused FTES left after implementing the distance education strategy would drop to just 9,078 FTES.

Year-round operations—combined model. The Commission assumed that the theoretical increase in capacity of 35 percent (discussed above) should be cut in half to 17.5 percent to reflect (1) the practical difficulties associated with implementing year-round schedules and (2) to ensure that the Commission's estimates are conservative and attainable. Table 21 shows that year-round operations, if implemented after implementing distance education and afternoon scheduling, would reduce unmet demand to just 1,615 FTES, virtually eliminating much of the estimated need to build new facilities to accommodate growth.

FACILITIES SAVINGS: THE BOTTOM LINE

Table 22 shows that an estimated $3 billion in facilities costs could be avoided if the Commission's recommendations are implemented as proposed in the model. The table shows anticipated growth in unhoused FTES before and after implementing the Commission's recommendations. The cost of accommodating the remaining 1,615 FTES and of building the support facilities required for afternoon scheduling would be $180 million. When subtracted from

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[31]The entire community college system in Maine is conducted in a telecourse mode. As described in *Choosing the Future*, Coastline Community College enrolls 25 percent of its students in some 25 academically-rigorous telecourses. The credits earned by Coastline students are fully transferable to UC and CSU.

Table 22

Estimated Facilities Savings from Telecourses, Afternoon Scheduling and Year-round Operations as a Combined Policy

(Millions of 1991 Constant $s)

New Future Demand	**272,265**
Future Demand Satisfied by Telecourse in 2005	228,766
Future Demand Satisfied by Afternoon Scheduling after Telecourse	34,420
Future Demand Satisfied by Year-round Operations after Telecourse & Afternoon Scheduling	7,463
Unmet Demand after Telecourse, Afternoon Scheduling and Year-round Operations	**1,615**
Cost of Met Demand: Afternoon Scheduling (Support Facilities)	$161.40
Cost of Unmet Demand	$19.19
Total Cost	$180.59
Cost with Business As Usual	$3,236.50
Total Savings	**$3,055.91**
Bond Retirement Interest Savings @ 6% for 20 years	**$1,925.22**
Total Savings	**$4,981.13**

the $3.2 billion in total estimated new and expanded facilities needs, the estimated savings resulting from implementing the Commission's recommendations is over $3 billion.

Table 23 shows the estimated annual cash savings resulting from the estimated $3 billion reduction in facilities construction costs through 2005. The table assumes that annual savings would be the sum of principal and interest costs from retiring $3 billion in 20 year bonds at 6 percent interest and that these bonds would have been sold as part of an overall bond sales program of $6 billion, sold pursuant to the following schedule: $250 million per year in 1992 and 1993; $500 million per year in 1994 and 1995; and, $450 million per year from 1996 through 2005.[32]

[32]California Postsecondary Education Commission, op. cit.

Table 23

Estimated Facilities Savings (Bond Retirement) per year from Telecourses, Afternoon Scheduling and Year-round Operations as Combined Policy

(Millions of 1991 Constant $s)

Strategy	Total Savings	Savings/yr.	Bond Retirement	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Telecourses	$2,719.42	$247.22	$20.15	$0.00	$20.15	$40.30	$60.45	$80.59	$100.74	$120.89	$141.04	$161.19	$181.34	$201.48	$221.63
Afternoon Scheduling	$247.77	$22.52	$1.84	$0.00	$1.84	$3.67	$5.51	$7.34	$9.18	$11.01	$12.85	$14.69	$16.52	$18.36	$20.19
Year-Round Operations	$88.72	$8.07	$0.66	$0.00	$0.66	$1.31	$1.97	$2.63	$3.29	$3.94	$4.60	$5.26	$5.92	$6.57	$7.23
Total				$0.00	$22.64	$45.28	$67.92	$90.57	$113.21	$135.85	$158.49	$181.13	$203.77	$226.42	$249.06

IV. MORE EFFICIENT MANAGEMENT PRACTICES

(Recommendation III, Strategy 1, pages 70-72)

The Commission recommends that the Board of Governors set a system-wide goal of achieving non-instructional cost reductions of ten percent by the year 2005 through greater efficiency. The Commission believes this is feasible if the community colleges adopt and practice the principles of the so-called "quality movement" and that greater efficiency would also result from improvements in management and information technologies and changes in governance recommended by the Commission (see Recommendation III, Strategy 2, Action 4, page 87 and Strategy 3, pages 89-95).

Several California community colleges are already working with or seriously investigating quality movement principles. Nationally, a 16 member network of colleges and universities are actively implementing these principles.[33] Estimating the potential for generating savings through greater management efficiencies is a difficult task at best. Already, however, community colleges implementing these principles have achieved significant savings. El Camino College, for example, reports savings resulting from improved procurement practices of over $450,000.[34] Private corporations have also experienced significant increases in efficiency as a result of implementing quality movement principles. In a letter to the *Harvard Business Review*, the chief executives of several major firms reported savings in the billions of dollars, significant reductions in product development time, and reductions in the number of product defects.[35]

Based on these examples, the Commission estimates that California community colleges can achieve savings in non-instructional costs of ten percent by the year 2005. Specifically, the savings from more efficient management shown in Table 1 assume that non-instructional costs are 47 percent of all operational costs and that the colleges will begin to achieve savings of one percent of non-instructional costs starting in 1995, increasing these savings by one percent per year until they reach the ten percent savings level by the year 2005.

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[33]Commission on Innovation, *Discussion of Policies for Achieving Continuous Improvement in Community Colleges*, Policy Discussion Paper #1, June 1992. Berkeley, CA: BW Associates, 1992, WP-110.

[34]Ibid.

[35]James Robinson, "An Open Letter: TQM on the Campus," Harvard Business Review, Nov-Dec 1991.

SELECTED BIBLIOGRAPHY

The following selected bibliography lists materials consulted by the Commission and Commission staff over the course of the Commission's deliberations.

Adams, Dennis M. *Cooperative Learning and Educational Media: Collaborating with Technology and Each Other*. Englewood Cliffs, NJ: Educational Technology Publications, 1990.

Adams, Dennis M. *Electronic Learning: Issues and Teaching Ideas for Educational Computing, Television, and Visual Literacy*. Springfield, IL: Thomas, 1987.

Alfred, Richard L., ed. *Coping with Reduced Resources*. San Francisco, CA: Jossey-Bass Inc., 1978.

Ali, Saeed, Jorge R. Sanchez, and Scot L. Spicer. *Statewide Survey of ESL Student Populations: Overview*. Glendale, CA: Glendale Community College Planning and Research Office, November 1989.

Anandam, Kamala. "Instructional Technology: Fifteen Years Later." *AACJC Journal*, October/November 1989.

Anandam, Kamala. "Technology for Education: Promises and Problems." In *New Directions for Community Colleges*. Edited by George Voegel, No. 55, Fall 1986.

Anandam, Kamala, ed. *Transforming Teaching with Technology: Perspectives from Two-Year Colleges*. McKinney, Texas: Academic Computing Publications, Inc., 1989.

Anderson, Richard E., and Joel W. Meyerson, eds. *Financing Higher Education: Strategies After Tax Reform*. New Directions for Higher Education, No. 58. San Francisco, CA: Jossey-Bass, Summer 1987.

Andrews, J.D. "Teaching Format and Students Style: Their Interactive Effects on Learning." *Research in Higher Education*, Vol. 14, 1981.

Angelo, Thomas A., and K. Patricia Cross. *Classroom Assessment Techniques: A Handbook for College Teachers*, 2nd ed. San Francisco, CA: Jossey-Bass Publishers, March 1993.

Antelope Valley College. *1992 Educational Master Plan*. Greenbrae, CA: Fleming Associates, Educational and Facilities Planning, 1992.

ASQC/FICE, Proceeding of the May 26, 1988 Seminar Proposing a National Quality Initiative, 1988.

ASQC/FICE/COPA/NCATE, Summary Proceeding of the Second National Educational Quality Initiative (NEQI) Conference, 1989.

Assembly Committee on Higher Education. "Master Plan for Higher Education." Sacramento, CA: California State Assembly, April 1993.

Assembly Committee on Higher Education. "Master Plan for Higher Education: Prospectus for a Focused Review." Sacramento, CA: California State Assembly, 1993.

Association of California Community College Administrators. *President's Study of Teaching Loads*, Resource Book XXII. Sacramento, CA: ACCCA, June 1992.

"At These Shouting Matches, No One Says a Word." *Business Week*, June 11, 1990.

Axland, Suzanne, ed. "Looking for Quality Education." *Quality Progress*, October 1991.

Ballinger, Charles E., Norman Kirschenbaum, and Rita Pokol Poimbeauf. *The Year-Round School: Where Learning Never Stops.* Bloomington, IN: Phi Delta Kappa Educational Foundation, 1987.

Barbee, E., and G. Ofiesh. *A Report on the "Nationwide State of the Art" of Instructional Technology.* Washington, D.C.: United States Department of Labor, the Secretary's Commission on Achieving Necessary Skills, 1990.

Barr, R. "New Paradigms for Community Colleges: Focus on Learning Instead of Teaching." *Ad Com* (Newsletter of the Association of California Community College Administrators). October, 1993.

Beckham, B. "Strangers in a Strange Land: The Experience of Blacks on White Campuses." *Educational Record*, Vol. 68(4), Vol. 69(1), 1988.

Benanzer, Elizabeth, Shirley A. Council, and Patricia A. Garrison. "A Rising Sun Shines on American Training." *Vocational Education Journal*, 66(5). American Vocational Association, May 1991.

Beno, Barbara. "Access, Involvement and Success in Distance Learning." *New Pathways to a Degree: Project Evaluation, First Year Report.* The Western Cooperative for Educational Telecommunications, 1993.

Berry, T. *Managing the Total Quality Transformation.* New York: McGraw-Hill, 1991.

Bishop, Ann P. "Promise of a New Information Environment." *Educational Technology*, February 1991.

Blakesley, James F. "Scheduling and Utilization." *Planning for Higher Education*, Summer 1992.

Bober, Roger P. "Faculty Externships: Catalysts for TQM." *Leadership Abstracts*, Vol. 4, No. 14, November 1991.

Borthwick, P., and K. Henson. "Matching Styles: A Historical Look." *Theory to Practice*, Vol. 23, Winter 1984.

Bossert, James L. *Quality Function Deployment: A Practitioner's Approach.* Milwaukee, WI: ASQC Quality Press, 1991.

Boston, Roger L. "Remote Delivery of Instruction via the PC and Modem: What Have We Learned?" *The American Journal of Distance Education*, Vol. 6, No. 3, 1993.

Bouvier, Leon F. *Fifty Million Californians?* Washington, D.C.: Pine Hill Press, Inc., 1991.

Bowen, Frank M., and Lyman A. Glenny. *Statewide Organization of the California Community Colleges*. Sausalito, CA: Glenny/Bowen, 1986.

Brawer, Jennifer. "Telecommunications: Options for Nontraditional Undergraduate and Graduate Learning." *A+*, Vol. 7, Issue 2, February 1989.

Brillhart, L., and M. Debs. "An Engineering-Rhetoric Course: Combining Learning-Teaching Styles." *Improving College and University Teaching*, Vol. 30, 1982.

Brown, Carl, Marcia Norris, and Jill Rivers. "High Tech Centers for the Disabled: The Future of Computer Access in the California Community Colleges." *Transforming Teaching with Technology: Perspectives from Two-Year Colleges*, Anandam, Kamala, ed. EDUCOM Strategies Series on Information Technology, (nd).

BW Associates. *A Study of California's Community Colleges*, Volumes 1 - 3. Berkeley, CA: BW Associates, 1985.

California Code of Regulations, Barclays Official. Title 5, Div. 6, Div. 7. South San Francisco, CA: Barclays Law Publishers, April 24, 1992.

California Community College Economic Development Network. *CEDIS Initial Pilot Report: Fiscal Year 90/91*. San Carlos, CA: ED>Net, 1992.

California Community College Trustees. *A Critique of the Proposed Restructuring of California Community Colleges*. Sacramento, CA: California Community College Trustees, 1986.

California Community College Trustees. *Community College Governance: Three Reform Recommendations*. Sacramento, CA: California Community College Trustees, 1986.

California Community College Trustees, and Chief Executive Officers of the California Community Colleges. *A New Partnership in Governance*. Sacramento, CA: CCCT and CEOCCC, 1986.

California Community College Trustees, Chief Executive Officers of the California Community Colleges, and Association of California Community College Administrators. *Response to the Joint Committee's Draft Report on Community College Reform*. Sacramento, CA: CCCT, CEOCCC, and ACCCA, 1986.

California Community Colleges. "The Will to Change." Segmental Response to the Master Plan Review Commission's Reassessment Study of the California Community Colleges. Sacramento, CA: California Community Colleges, February, 1986.

California Community Colleges, Academic Senate. "24th Fall Session Resolutions." Sacramento, CA: California Community Colleges, November 5-7, 1992.

California Community Colleges, Amnesty Education Unit. *Caught in the Shadows: Immigrant Educational Access - The Amnesty Population*. Glendale, CA: Glendale Community College Planning and Research Office, April 1992.

California Community Colleges, Board of Governors. "Understanding Community College Governance." Sacramento, CA: April, 1986.

California Community Colleges, Board of Governors. *Education Code Review: Delineation of*

Governance Functions. Sacramento: California Community Colleges, April 16-17, 1987.

California Community Colleges, Board of Governors. *Comprehensive Community College Reform Legislation: Assembly Bill 1725*. Sacramento: California Community Colleges, May 28-29, 1987.

California Community Colleges, Board of Governors. *Agenda Item 5: Long-Range Capital Outlay Planning*. Sacramento, CA: September 14-15, 1989.

California Community Colleges, Board of Governors. *Policy on Shared Governance in the California Community Colleges*. Sacramento: California Community Colleges, 1990.

California Community Colleges, Board of Governors. *Policy Statement on Shared Governance*. Sacramento, CA: California Community Colleges, January, 1990.

California Community Colleges, Board of Governors. *Agenda Item 4: Long-Range Capital Outlay Plan*. Sacramento, CA: September 13-14, 1990.

California Community Colleges, Board of Governors. *Agenda Item 7: Long-Range Capital Outlay Growth Plan*. Sacramento, CA: November 8-9, 1990.

California Community Colleges, Board of Governors. *Understanding Community College Governance*. Sacramento, CA: California Community Colleges, April 1986.

California Community Colleges, Board of Governors. *Funding Gap Study*. Sacramento, CA: California Community Colleges, April 1986.

California Community Colleges, Board of Governors. *Prioritized Requests from Community College Districts for Funding of Capital Outlay Projects, 1993-94*. Sacramento, CA: September 10-11, 1992.

California Community Colleges, Board of Governors. *Budget and Accounting Manual*. Sacramento, CA: California Community Colleges, 1993 Edition.

California Community Colleges, Board of Governors. *1993 Study of Fee Impact*. Sacramento, CA: California Community Colleges, March 11-12, 1993.

California Community Colleges, Board of Governors. *Agenda Item 6: 1993 Study of Fee Impact: Phase 2*. Sacramento, CA: May 13-14, 1993.

California Community Colleges, Board of Governors. *Agenda Item 10: Distance Learning in the California Community Colleges*. Sacramento, CA: May 13-14, 1993.

California Community Colleges, Board of Governors. *Systemwide Guidelines for Registration Priorities*. Sacramento, CA: California Community Colleges, May 13-14, 1993.

California Community Colleges, Fiscal Services Unit. "History of Selected Data: Fiscal Years 1973-74 thru 1989-90." *Annual Fiscal Data Abstracts*. Sacramento, CA: California Community Colleges, June 1991.

California Community Colleges, Fiscal Services Unit. "Full Time Equivalent Students (FTES): Fiscal Year 1991-92." *Annual Fiscal Data Abstracts*. Sacramento, CA: California Community Colleges, February 1993, Draft.

California Community Colleges, Matriculation Work Group, and University of Kansas, Center for Education. *Standards, Policies and Procedures for the Evaluation of Assessment Instruments Used in the California Community Colleges.* Sacramento, CA: August 1992.

California Community Colleges, Office of the Chancellor. *Improving It: Accountability By Design.* San Francisco, CA: Far West Laboratory, (nd).

California Community Colleges, Office of the Chancellor. *Study of Fee Impact: Final Report.* Report No. 873. Sacramento, CA: California Community Colleges, June 1987.

California Community Colleges, Office of the Chancellor, Facilities Planning and Utilization Unit. *1992-93 Five-Year Capital Outlay Plan.* Sacramento, CA: California Community Colleges, 1991.

California Community Colleges, Office of the Chancellor, Research and Analysis Unit. *Long-Range Capital Outlay Growth Plan.* Sacramento, CA: California Community Colleges, January 1991.

California Community Colleges, Office of the Chancellor, Research and Analysis Unit. *Trends in Faculty Staffing and Salaries.* Sacramento, CA: California Community Colleges, June 1991.

California Community Colleges, Office of the Chancellor, Research and Analysis Unit. *Important Trends for California Community Colleges: 1991 Update.* Sacramento, CA: California Community Colleges, July 1991.

California Community Colleges, Office of the Chancellor, Facilities Planning and Utilization Unit. "Capital Outlay Budget Change Proposals: Instructions for Preparing 1993-94 Proposals." Sacramento, CA: California Community Colleges, November 1991.

California Community Colleges, Office of the Chancellor, Amnesty Education Unit. *The New Californians: Ten Facts about Immigration Amnesty Applicants.* Sacramento, CA: California Community Colleges, 1992.

California Community Colleges, Office of the Chancellor. *Estimate of Fall 1991 Enrollment.* Sacramento, CA: California Community Colleges, January, 1992.

California Community Colleges, Office of the Chancellor, Fiscal and Business Services. *Fiscal Data Abstract: 1990-91.* Sacramento, CA: California Community Colleges, April 1992.

California Community Colleges, Office of the Chancellor, Facilities Planning and Utilization. *Report on Staffing and Salaries: Fall 1991.* Sacramento, CA: California Community Colleges, July 1992.

California Community Colleges, Office of the Chancellor, AB 1725 Accountability Task Force. *Accountability: An Investment of Quality.* California Community Colleges, August 1992.

California Community Colleges, Office of the Chancellor, Transfer and General Education Division. *The Curriculum Standards Handbook For the California Community Colleges.* Sacramento, CA: October 1992.

California Community Colleges, Office of the Chancellor, Research and Analysis Unit. "R & A Memo #93-15: FTES Projection thru 2005-06". Sacramento, CA: California Community Colleges, May 1993.

"California Community Colleges Record 9-Percent Enrollment Drop: More Than 100,000 Students Say No to Tuition Increase." *Community College Week,* Vol. 5, No. 15, March 15, 1993.

California Department of Finance, Demographic Research Unit. "Population Projections by Age." Sacramento, CA: June 2, 1992.

California Planning Commission for Educational Technology. *California Educational Technology Summit: Proceedings.* Sacramento, CA: April 25 & 26, 1991.

California Planning Commission for Educational Technology. *The California Master Plan for Educational Technology.* Submitted to California Legislature, April 22, 1992.

California Postsecondary Education Commission. *Proposed Creation of a California State University, San Bernadino, Off-Campus Center in the Coachella Valley.* Sacramento, CA: CPEC (85-40), December 1985.

California Postsecondary Education Commission. *Effects of the Mandatory Statewide Fee on California Community College Enrollments.* Sacramento, CA: CPEC (86-32), December 1986.

California Postsecondary Education Commission. *Education Offered Via Telecommunications.* Sacramento, CA: CPEC (87-49), 1987.

California Postsecondary Education Commission. *Statewide Fees in the California Community Colleges: A Report to the Governor and the Legislature in Reponse to Assembly Bill 1XX (1984).* Sacramento, CA: CPEC (87-1), February 1987.

California Postsecondary Education Commission. "Developments in Community College Finance." Sacramento, CA: CPEC (87-46), December 1987.

California Postsecondary Education Commission. *Technology and the Future of Education: Directions for Progress.* Sacramento, CA: CPEC (89-27), September 1989.

California Postsecondary Education Commission. *Higher Education at the Crossroads: Planning for the Twenty-First Century, Staff Presentation of Report Displays.* Sacramento, CA: CPEC, 1990.

California Postsecondary Education Commission. *A Capacity for Learning: Revising Space and Utilization Standards for California Public Higher Education.* Sacramento, CA: CPEC (90-3), January 1990.

California Postsecondary Education Commission. *Calculation of Base Factors for Comparison Institutions and Study Survey Instruments.* Sacramento, CA: CPEC (90-5), January 1990.

California Postsecondary Education Commission. *Guidelines for Review of Proposed Campuses and Off-Campus Centers: A Revision of the Commission's 1982 Guidelines and*

Procedures for Review of New Campuses and Off-Campus Centers. Sacramento, CA: CPEC (90-9), January 1990.

California Postsecondary Education Commission. *Higher Education at the Crossroads: Planning for the Twenty-First Century*. Sacramento, CA: CPEC (90-1), January 1990.

California Postsecondary Education Commission. "Issues Related to Year-Round College and University Operation." *Technical Background Papers to Higher Education at the Crossroads: Planning for the Twenty-First Century*. Sacramento, CA: CPEC (90-2), January 1990.

California Postsecondary Education Commission. "Joint or Shared Use of Facilities in Higher Education in Selected States." *Technical Background Papers to Higher Education at the Crossroads: Planning for the Twenty-First Century*. Sacramento, CA: CPEC (90-2), January 1990.

California Postsecondary Education Commission. "Planning Our Future." *Technical Background Papers to Higher Education at the Crossroads: Planning for the Twenty-First Century*. Sacramento, CA: CPEC (90-2), January 1990.

California Postsecondary Education Commission. *Student Profiles 1990*. Sacramento, CA: CPEC (90-23), October 1990.

California Postsecondary Education Commission. *Information Item 8: Policy Development Committee, Prospectus for the Commission's 1992 Work Related to Financing of California Public Higher Education*. Sacramento, CA: CPEC, 1991.

California Postsecondary Education Commission. *State Policy on Technology for Distance Learning*. Sacramento, CA: CPEC (91-7), 1991.

California Postsecondary Education Commission. *Student Fees, Access, and Quality: Prospects and Issues for the 1992-93 Budget Process*. Sacramento, CA: CPEC (91-20), December 1991.

California Postsecondary Education Commission. *Information Item 8: Policy Development Committee, Fiscal Profiles, 1992*. Sacramento, CA: CPEC, 1992.

California Postsecondary Education Commission. "Issues Confronting California Higher Education." Sacramento, CA: CPEC, 1992.

California Postsecondary Education Commission. *Presentations to the Commission on Innovation, San Francisco, February 18, 1992*. Berkeley, CA: BW Associates, 1992.

California Postsecondary Education Commission. *Prospects for Long-Range Capital Planning in California Public Higher Education: A Preliminary Review*. Sacramento, CA: CPEC (92-4), January 1992.

California Postsecondary Education Commission. *Financing California Higher Education*. Sacramento, CA: CPEC Higher Education Update, January 27, 1992.

California Postsecondary Education Commission. *Analyses of Options and Alternatives for California Higher Education*. Sacramento, CA: CPEC (92-7), March 1992.

California Postsecondary Education Commission. *Commission Comments on the Systems' Preliminary Funding Gap Reports.* Sacramento, CA: CPEC (92-6), March, 1992.

California Postsecondary Education Commission. *Fiscal Profiles: 1992.* Sacramento, CA: March 1992.

California Postsecondary Education Commission. *Information Item 17: Administration and Liaison Committee, Legislative Update for March 1992.* Sacramento, CA: CPEC, March 1992.

California Postsecondary Education Commission. *Meeting the Educational Needs of the New Californians.* Sacramento, CA: CPEC (92-11), March 1992.

California Postsecondary Education Commission. *Student Profiles 1991.* Sacramento, CA: CPEC (92-10), March 1992.

California Postsecondary Education Commission. *Ensuring California's Capacity to Meet the Higher Educational Needs of the Next Generation.* Sacramento, CA: CPEC Testimony Before the Assembly Ways and Means Subcommittee No. 2, March 3, 1992.

California Postsecondary Education Commission. "Nonresident Charges at California's Public Universities." Sacramento, CA: CPEC Factsheet 1, March 10, 1992.

California Postsecondary Education Commission. *Resident Charges at California's Public Universities.* Sacramento, CA: CPEC Factsheet 2, March 10, 1992.

California Postsecondary Education Commission. *Total Cost of Attendance at California's Public Universities.* Sacramento, CA: CPEC Factsheet 3, March 10, 1992.

California Postsecondary Education Commission. *Reaffirmation of Commission Policy on Student Fees and Other Financing Options.* Sacramento, CA: CPEC, March 30, 1992.

California Postsecondary Education Commission. *Information Item 7: Fiscal Policy and Analysis Committee, Context for Construction: A Model for Statewide Capital Planning.* Sacramento, CA: CPEC, May 31, 1992, Draft.

California Postsecondary Education Commission. *Eligibility of California's 1990 High School Graduates for Admission to the State's Public Universities.* Sacramento, CA: CPEC (92-14), June 1992.

California Postsecondary Education Commission. *Postsecondary Enrollment Opportunities for High School Students.* Sacramento, CA: CPEC (92-13), June 1992.

California Postsecondary Education Commission. *A Framework for Statewide Facilities Planning.* Sacramento, CA: CPEC (92-17), August 1992.

California Postsecondary Education Commission. *Commission Comments on the Systems' Final Funding Gap Reports.* Sacramento, CA: CPEC (92-20), August 1992.

California Postsecondary Education Commission. *Meeting the Challenge: Preparing for Long-Term Changes in California Higher Education.* Sacramento, CA: CPEC (92-25), August 1992.

California Postsecondary Education Commission. *Postsecondary Student Enrollment by Student Level.* Sacramento, CA: CPEC, August 1992.

California Postsecondary Education Commission. *Mission of the Ad Hoc Committee on the Financing and Future of California Higher Education, and Principles to Guide its Work.* Sacramento, CA: CPEC, December 6, 1992, Draft.

California Postsecondary Education Commission. *Information Item 1, Ad Hoc Committee on the Financing and Future of California Higher Education, Family Financial Resources of California Undergraduates.* Sacramento, CA: CPEC, February 21, 1993.

California Postsecondary Education Commission. *Information Item 2, Ad Hoc Committee on the Financing and Future of California Higher Education, Options and Alternatives for Undergraduate Student Fee and Financial Aid Policies.* Sacramento, CA: CPEC, February 21, 1993, Draft.

California Postsecondary Education Commission. *Information Item 5: Fiscal Policy and Analysis Committee, Expenditures for University Instruction.* Sacramento, CA: CPEC, February 22, 1993, Draft.

California Postsecondary Education Commission. *A Fresh Look at California Higher Education: A Discussion Paper Focusing on the Future.* CPEC Agenda Item 4, April 18, 1993.

California Postsecondary Education Commission. *Action Item 3, Ad Hoc Committee on the Financing and Future of California Higher Education: Undergraduate Student Charges and Financial Aid at California's Public Universities.* Sacramento, CA: CPEC, April 18, 1993, Draft.

California Postsecondary Education Commission. "Staff's Analysis of Options and Alternatives for Preserving Maximum Access and Opportunity in California Higher Education." *Information Item 4: Ad Hoc Committee on the Financing and Future of California Higher Education."* Sacramento, CA: CPEC, April 19, 1993, Draft.

California Postsecondary Education Commission. "The Master Plan, Then and Now: Policies of 'A Master Plan for Higher Education 1960 - 1975', in Light of 1993 Realities." *Information Item 6: California Postsecondary Education Commission.* Sacramento, CA: CPEC, April 19, 1993.

California Postsecondary Education Commission. "A Fresh Look at California Higher Education: A Discussion Paper Focusing on the Future." *Information Item 2: Ad Hoc Committee on the Financing and Future of California Higher Education.* Sacramento, CA: CPEC, December 5, 1993, Draft.

California State Legislature, Assembly. *Assembly Bill No. AB 1261.* 1993.

California State Legislature, Assembly. *Assembly Bill No. 1497, Chapter 1214.* 1991.

California State Legislature, Assembly. *Assembly Bill No. 1725, Chapter 973.* 1988

California State Legislature, Joint Committee for the Review of the Master Plan for Higher Education. *California Community College Reform.* Sacramento, CA: California Legislature, 1987.

California State Legislature, Joint Committee for the Review of the Master Plan for Higher Education. *California Faces... California's Future: Education for Citizenship in a Multicultural Democracy.* Sacramento, CA: California Legislature, 1987.

California State Legislature, Senate. *Senate Bill No. 918, Chapter 1011.* 1991.

California State Legislature, Senate. *Senate Bill No. 1510, Chapter 1309.* 1992.

California State University, Office of the Chancellor. "The 1989 California State University Growth Plan for 1990-2005: Growth and Diversity: Meeting the Challenge." Long Beach, CA: The California State University, October 1989.

California State University, Office of the Chancellor. *Intersegmental General Education Transfer Curriculum Notes.* Long Beach, CA: The California State University, March 1991.

Callan, Patrick M. "California's Master Plan for Higher Education: Some Second Thoughts for the Fourth Decade." *The OECD, the Master Plan and the California Dream: A Berkeley Conversation.* Edited by Sheldon Rothblatt. Berkeley, CA: Center for Studies in Higher Education, 1992.

Callan, Patrick M., and Joni E. Finney. *By Design or Default.* San Jose, CA: The California Higher Education Policy Center, June 1993.

Caruso, Denise. "Inside Technology: Computers are Enlisting in Illiteracy Wars." *The San Francisco Examiner,* August 26, 1990.

Center for Research and Evaluation in the Application of Technology to Education. *CREATE, Second Annual Report.* Palo Alto, CA: Office of Educational Research and Improvement, 1985.

Chaffee, Ellen Earle. *Total Quality Management: A Guide for the North Dakota University System.* North Dakota: State Board of Higher Education, 1991.

Champy, James, and Michael Hammer. "The Promise of Reengineering." *Reengineering the Corporation: A Manifesto for Business Revolution.* HarperCollins Publishers Inc., May 1993. Quoted in *Fortune,* May 3, 1993.

Charlier, Marj. "Ailing College Treats Students as Customer and Soon Is Thriving." *Wall Street Journal,* July 17, 1991.

Chicago City Wide College. "Center for Open Learning: Summer/Fall Schedule." Chicago, IL: City Colleges of Chicago, 1990.

Clagett, Craig A., and Daniel D. McConochie. "Accountability in Continuing Education: Measuring Noncredit Student Outcomes." *AIR Professional File,* No. 42. Tallahassee, FL: Association for Institutional Research, Fall 1991.

Clark, George W. *The Essentials of Local Autonomy: A Contemporary Focus on Control and Responsibility.* Sacramento, CA: California Community and Junior College Association, 1980.

Clark, Thomas A., and John R. Verduin, Jr. *Distance Education: The Foundations of Effective People.* San Francisco, CA: Jossey-Bass Inc., 1991.

Claxton, C.S., and P.H. Murrell. *Learning Styles: Implications for Improving Education Practices.* ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: Association for the Study of Higher Education, 1987.

Coate, L.E. "Implementing Total Quality Management in a University Setting." Oregon State University, July 1990.

Cognition and Technology Group, Learning Technology Center, Peabody College of Vanderbilt University. "Enhancing Learning in At-risk Students: Applications of Video Technology." *Educational Technology*, May 1990.

"Colleges Use Videoconferences to Trim Their Travel Budgets." *Chronicle of Higher Education*, December 11, 1991.

Commission for the Review of the Master Plan for Higher Education. *Background Papers: The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento. CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission for the Review of the Master Plan for Higher Education. *The Challenge of Change: A Reassessment of the California Community Colleges.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1986.

Commission for the Review of the Master Plan for Higher Education. "Community College Governance." *Background Papers, The Challenge of Change: A Reassessment of the California Community Colleges.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1986.

Commission for the Review of the Master Plan for Higher Education. "Governance of Postsecondary Education: Governance of the Community Colleges; Policy Direction for Student Financial Aid; Long-Range Planning; Joint Programs; Intersegmental Coordination; Collaboration with the Public School System; Policy Advice for the Governor and the Legislature." *Issue Papers, The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission for the Review of the Master Plan for Higher Education. "The Governance of Postsecondary Education in California: An Overview of the Existing Structure and Its Evolution; Governance of the Public Institutions; Private Institutional Coordination; Student Aid Administration; Statewide Coordination; The Role of the Legislature and the Governor; A Brief Comparison with Other States." *Background Papers, The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission for the Review of the Master Plan for Higher Education. *Issue Papers, The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission for the Review of the Master Plan for Higher Education. *The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission for the Review of the Master Plan for Higher Education. Minutes from meetings on December 16-17, 1986, January 20-22, 1987, and March 18, 1987. *Issue Papers, The Master Plan Renewed: Unity, Equity, Quality, and Efficiency in California Postsecondary Education.* Sacramento, CA: Commission for the Review of the Master Plan for Higher Education, 1987.

Commission on Innovation, Instruction Task Force. "Final Report." 1993.

Commission on Minority Participation in Education and American Life. *One Third of a Nation.* Washington, D.C.: American Council on Education, May 1988.

Commission on State Finance. *Quarterly General Fund Forecast.* Sacramento, CA: Commission on State Finance, October 1992.

Commission on State Finance. *Quarterly General Fund Forecast.* Sacramento, CA: Commission on State Finance, January 1993.

Commission on the Future of the North Carolina Community College System. *The Bridge to the Next Century,* A Commentary by The National Advisory Panel. North Carolina: MDC, Inc., May 1988.

Commission on the Future of the North Carolina Community College System. *Gaining the Competitive Edge: The Challenge to North Carolina's Community Colleges.* North Carolina: MDC, Inc., February 1989.

Commission on the Future of the North Carolina Community College System. *On the Edge: Three Years After the Report of the Commission on the Future of the North Carolina Community College System.* North Carolina: MDC, Inc., 1992.

Commission on the Future of the North Carolina Community College System. *Possible Issues for the Consideration of the Committee on Governance, Leadership, and Institutional Relationships.* North Carolina: MDC, Inc., April 21, 1988.

The Commission on the Skills of the American Workforce. *America's Choice: High Skills or Low Wages!* New York: National Center on Education and the Economy, 1990.

Commission on the University of the 21st Century, *The Case for Change.* Commonwealth of Virginia, (nd).

Community, Technical, and Junior College Journal. Vol. 61, No. 4, February/March 1991.

Community College League of California. "Board of Governors' Proposed Guidelines for Local Registration Priorities." *Consultation Brief.* Sacramento, CA: CCLC, January 30, 1993.

Community College League of California. *Response to the Assembly Committee on Higher Education's Draft Report "Master Plan for Higher Education in Focus".* Testimony of Chancellor David Mertes. Sacramento, CA: CCLC, April 27, 1993.

Community College League of California. *A Response to the Assembly Committee on Higher Education's Draft Report "Master Plan for Higher Education in Focus".* Sacramento, CA: CCLC, May 4, 1993.

Community College League of California. *Facing the Millennium: California Community Colleges into the 21st Century.* Sacramento, CA: CCLC, August 1993.

Community College League of California, Commission on Instruction. "Telecommunications Survey." Sacramento, CA: CCLC, Spring 1991.

Community College League of California, Commission on the Future. "California Community Colleges in 2010: Four Scenarios." Summary of Annual Meeting. Oakland, CA: CCLC, April 23-24, 1993.

Contacts: Satellite Learning Program and Resource Guide. Alvin, TX: Communications and Data Systems Associates, Inc., (nd).

Coordinating Council for Higher Education. *Report and Recommendations on Governance of the California Junior Colleges.* Coordinating Council for Higher Education, 1966.

Cornesky, R.A., and colleagues. *W. Edwards Deming: Improving Quality in Colleges and Universities.* Madison, WI: Magna Publications, 1990.

Corno, L., and R. Snow. "Adapting Teaching to Individual Differences Among Learners." *Handbook of Research on Teaching,* M. Witrock (ed.). New York: Macmillan, 1986.

Council on California Competitiveness. *California's Jobs and Future.* Sacramento, CA: April 23, 1992.

Cradler, John. *Comprehensive Study of Educational Technology Programs in California Authorized from 1984-1992,* Executive Summary. San Francisco, CA: 1993.

Crosby, Philip. *Quality is Free.* New York: Mentor Books, New American Library, ????

Cross, K. Patricia, and Thomas A. Angelo. *Classroom Assessment Techniques: A Handbook for Faculty.* Ann Arbor, MI: National Center for Research To Improve Postsecondary Teaching and Learning, 1988.

Cuesta College, San Luis Obispo County Community College District. *Educational and Facilities Master Plan 1991.* San Luis Obispo, CA: Cuesta College, 1991.

Danielson, Lynn M. *High Technology and High School: Preparing Students for California's Changing Economy.* Sacramento, CA: Office of Appropriate Technology, 1982.

Danzberger, Jacqueline P., Michael W. Kirst, and Michael D. Usdan. *Governing Public Schools: New Times, New Requirements.* Washington, D.C.: The Institute for Educational Leadership, Inc., 1992.

Dede, Christopher. *The Evolution of Distance Learning: Technology-Mediated Interactive Learning.* Washington, D.C.: Office of Technology Assessment, 1989.

Dede, Christopher. *Intelligent Computer-Assisted Instruction.* Newton, MA: The Center for Technology Assessment, 1985.

Deming, W.E. *Out of the Crisis*. Cambridge: MIT Center for Advanced Engineering, 1986.

Dervarics, Charles. "Educators Seek to Mesh Vocational Education With Community's Economic Needs." *Community College Week*, June 21, 1993.

Deutsch, Claudia H. "Business Meetings by Keyboard." *New York Times*, October 21, 1990.

Doty, Charles R. *Preparing for High Technology: Model Programs in the USA*. Columbus, OH: National Center for Research in Vocational Education, 1985.

Drucker, Peter. *Managing for the Future*. 1992

Drucker, Peter F. "The New Society of Organizations." *Harvard Business Review*, September-October 1992.

Drucker, Peter F. "The Post-Capitalist World." *The Public Interest*, Vol. 109, Fall 1992.

Dunphy, Tom. "Cost of Capital Analysis." Memorandum to Dr. Clarence Mangham, Dean, Facilities Planning and Utilization Unit, Chancellor's Office, California Community Colleges. San Francisco, CA: Lazard Freres & Co., January 13, 1993.

EDUCOM. "101 Success Stories of Information Technologies in Higher Education." Washington, D.C.: EDUCOM, 1991.

El Camino Community College District. "Total Quality Management: Will it Work For Your District?" Workshop for the Community College League of California, May 22, 1992.

Elson, John. "Campus of the Future." *Time*, April 13, 1992.

Eskow, Seymour. "Putting America Back to Work: Phase II." *Community and Junior College Journal*, 1983.

Evans, John. W. *Student Reactions to Class Cuts and Fee Increases*. Stockton, CA: Office of Institutional Research and Planning, San Joaquin Delta College, January 1993.

Ewel, Peter T., ed. *Enhancing Information Use in Decision Making*. New Directions for Higher Education, No. 64. San Francisco, CA: Jossey-Bass, Winter 1989.

Feasley, Charles E. "Serving Learners at a Distance." *ASHE-ERIC Higher Education Research Reports*, 1983.

"Fee Increase Forcing Out Students, Report Says." *Los Angeles Daily News*, April 15, 1993.

Fizzzel, R. "The Status of Learning Styles." *The Educational Forum*, Spring 1984.

Florida Postsecondary Education Planning Commission. "A Study of the Establishment of New Centers and Campuses and Long Range Potential Site Plans." Tallahassee, FL: FPEPC, October 24, 1986.

Foothill-De Anza Community College District. *Comparative Data Analysis: Budget Simulations*. Foothill-De Anza Community College District, November 1992.

Ford, N. "Styles and Strategies of Processing Information: Implications for Professional Education." *Education for Information*, Vol. 3, 1985.

Fountain, Ben E., and Terrence A. Tollefson, eds. *Forty-Nine State Systems*, 1992 Edition.

Washington, D.C.: American Association of Community College, National Center for Higher Education, 1992.

Fourier, M. "The Effectiveness of Disclosure of Students' Educational Cognitive Style Maps on Academic Achievement in Selected Community College Courses." Doctoral Dissertation, University of Missouri, 1980.

Fox, Warren H. *Meeting the Challenge: Preparing for Long-term Changes in California Higher Education.* Sacramento, CA: California Postsecondary Education Committee, 1992.

Franklin Patterson & Associates. *A Study of the Management of the Auraria Higher Education Center (AHEC).* Boston, MA: Franklin Patterson & Associates, September 1988. [For the Colorado Commission on Higher Education, State of Colorado]

Fretwell, E.K. "Possible Issues for the Consideration of the Committee on Governance, Leadership, and Institutional Relationships." North Carolina: Commission on the Future of the North Carolina Community College System, 1988.

Fuhrman, B., and A. Grasha. *Designing Classroom Experiences Based on Student Styles and Teaching Styles: A Practical Handbook for College Teaching.* Boston: Little, Brown & Co., 1983.

Gandara, Patricia. "Year-Round Schooling as an Avenue to Major Structural Reform." University of California at Davis, April 1992. (unpublished paper)

Garvin, D.A. *Managing Quality: The Strategic and Competitive Edge.* New York: Free Press, 1988.

Gifford, Bernard R. *Mediated Learning Systems in Higher Education: Making Good on the Promise of Instructional Technology.* Berkeley, CA: Interactive Media Study Group, University of California at Berkeley, September 28, 1992.

Gitlow, H.S., and S.J. Gitlow. *The Deming Guide to Quality and Competitive Position.* Englewood Cliffs, NJ: Prentice-Hall, 1987.

Gitlow, H.S., and Process Management International. *Planning for Quality, Productivity, and Competitive Position.* Homewood, Ill: Dow Jones-Irwin, 1990.

Glasser, William. *The Quality School.* New York: Harper & Row, 1990.

GOAL/QPC. *The Memory Jogger: A Pocket Guide of Tools for Continuous Improvement.* Methuen, Mass: GOAL/QPC, 1988.

Gobel, Darrell Z. "Network." *AACJC Journal,* October/November 1990.

Goldratt, Eliyahu M., and Jeff Cox. *The Goal: A Process of Ongoing Improvement.* New York: North River Press, 1986.

Goodwin, Gregory. *Celebrating Two Decades of Innovation.* The League for Innovation in the Community College, 1988.

Gordon, Richard. *High Technology, Employment, and the Challenges to Education.* Santa

Cruz, CA: Silicon Valley Research Group, 1985.

Green, Kenneth C., and Steven W. Gilbert, eds. *Making Computers Work for Adminstrators.* New Directions for Higher Education, No. 62. San Francisco, CA: Jossey-Bass, Summer 1988.

Green, M., ed. *Minorities on Campus: A Handbook for Enhancing Diversity.* Washington, D.C.: American Council on Education, 1988.

"Greenville Technical College: Committed to New Ideas." *AACJC Journal,* April/May 1991.

Gandara, Patricia. "Extended Year, Extended Contracts: Increasing Teacher Salary Options." *Urban Education,* Vol. 27, No. 3. Sage Publications, Inc. 1992.

Hall, James. *Access through Innovation: New Colleges for New Students.* Macmillan, 1990.

Halliday, Karen, and Peter White. "Matriculation Assessment Review." Sacramento, CA: California Community Colleges, Office of the Chancellor, July 2, 1993.

Halstead, D. Kent. *Statewide Planning in Higher Education.* Washington, D.C.: U.S. Government Printing Office, 1974.

Hammer, Michael. "Reengineering Work: Don't Automate, Obliterate." *Harvard Business Review,* July/August 1990.

Hankin, Joseph N. "Moving Your Institution Into The 21st Century." Speech Delivered to the College Board Conference, Valhalla, New York, November 13, 1990.

Hanson, Gayle. "Making Waves Via Computers." *Insight,* January 27, 1992.

Hayward, Gerald C., et al. *California Community College Accountability: State and Local Implementation Costs.* Berkeley, CA: Strategic Planning Associates, June 1991.

Houtrouw, David, and Stephen Mello. "Final Report of the Capital Outlay Funding Advisory Group." Sacramento, CA: California Community Colleges, December 9, 1991.

Howe, Kenneth. "Temp Work is 28% of Job Growth, Study Finds." *San Francisco Chronicle,* September 6, 1993.

Illinois Board of Higher Education. *Report on Meeting the Educational Needs of Underserved Areas.* Agenda Item 11. Springfield, IL: March 1988

Illinois Board of Higher Education. *Recommendations of the Committee to Study Underserved Areas: Enhancing Educational Opportunities.* Agenda Item 6. January 7, 1992.

Illinois Community College Board, Telecommunications Ad Hoc Task Force. *Telecommunications: A Paradigm for the Future of Illinois Higher Education.* Illinois: Illinois Community College Board, June 1992.

Illinois. *Administrative Code.* Higher Education Cooperation Act. Title 23, Subtitle A, Ch. II, Sec. 1010.10-1010.40.

Illinois. *Revised Statutes* (1989). Ch. 144: 281-286. Higher Education Cooperation Act, 1972.

Imai, M. *Kaizen: The Key to Japan's Competitive Success.* New York: Random House, 1986.

Immerwahr, John, and Steve Farkas. "The Closing Gateway: Californians Consider Their Higher Education System." Sacramento, CA: Public Agenda Foundation for the California Higher Education Policy Center, September 1993.

"In the Labs, The Fight to Spend Less, Get More." R & D Scoreboard, *Business Week*, June 28, 1993.

"Information Technology." *Chronicle of Higher Education*, various issues.

Institute for Future Studies. *The Top Ten Issues Facing America's Community Colleges.* 1991 Edition. Warren, MI: Institute for Future Studies at Macomb Community College, 1992.

Institute for Future Studies. *Critical Issues Facing America's Community Colleges.* Warren, MI: Institute for Future Studies at Macomb Community College, 1992.

Ishikawa, K. *What is Total Quality Control? The Japanese Way.* Englewood Cliffs, NJ: Prentice-Hall, 1985.

Jaeger, George. "Description of a Freshman Composition Class Taught Completely Online by Computer and Modem." *Ed*, Vol. 5, No. 4, April 1991.

Jamison, Dean T. "Cost Factors in Planning Educational Technology Systems." *Fundamentals of Educational Planning*, No. 24, 1977.

Jewett, Frank. *The 1989 California State University Growth Plan for 1990-2005: Growth and Diversity, Meeting the Challenge.* Long Beach, CA: The California State University, Office of the Chancellor, 1989.

Johnson, Judith L. *Evaluation Report of the Community College of Maine ITS.* Fall 1990.

Johnson, B. Lamar. *Islands of Innovation Expanding: Changes in the Community College.* Beverly Hills, CA: Glencoe Press, 1969.

Johnson, Lynn G. "The High-Technology Connection: Academic/Industrial Cooperation for Economic Growth." *ASHE-ERIC Higher Education Research Reports*, 1984.

Johnstone, Sally M., and Richard A. Markwood, ed. *New Pathways to a Degree: Project Evaluation, First Year Report.* Boulder, CO: Western Interstate Commission for Higher Education, June 1992.

Jones, Thomas B., and Chet Meyers. *Promoting Active Learning: Strategies for the College Classroom.* San Francisco, CA: Jossey-Bass Publishers, April 1993.

Jordan, Mary. "The Boob Tube University." *San Francisco Chronicle*, August 30, 1992.

Juran, J.M. *Juran on Planning for Quality.* New York: Free Press, 1988.

Juran, J.M. *Juran on Leadership for Quality: An Executive Handbook.* New York: Free Press, 1989.

Kaiser, Harvey H., ed. *Planning and Managing Higher Education Facilities.* New Directions for Institutional Research, No. 61. San Francisco: Jossey-Bass, Spring 1989.

Keller, George. "Increasing Quality on Campus: What Should Colleges Do About the TQM Mania?." *Change*, May/June 1992.

Kilborn, Peter T. "Workers Question Recovery's Promise: Experts See a Loss of Faith in Quick Economic Fixes." *San Francisco Chronicle*, September 6, 1993.

Knutsen, Kirk L. *Beyond Business as Usual: A Framework and Options for Improving Quality and Containing Costs in California Higher Education*. Sacramento, CA: California Research Bureau, May 6, 1993.

Kondracke, Morton. "Tremors on Horizon of Clinton Presidency." *San Francisco Chronicle*. November 26, 1992.

Kraul, Chris. "Anonymity Makes Electronic Boardroom Work." *Los Angeles Times*, November 6, 1990.

Kroll, Keith, ed. *Maintaining Faculty Excellence*. New Directions for Community Colleges, No. 79. San Francisco, CA: Jossey-Bass, Fall 1992.

Lannon-Kim, Colleen, and Peter Senge. "Recapturing the Spirit of Learning Through a Systems Approach." *The School Administrator*, November 1991.

Layzell, Daniel T., and Jan W. Lyddon. *Budgeting for Higher Education at the State Level: Enigma, Paradox, and Ritual*. Washington, DC: The George Washington University, 1990.

Layzell, Daniel T., and Mary P. McKeown. "State Funding Formulas for Higher Education: Trends and Issues." A Paper Presented at the 1992 ASHE Conference. Minneapolis, MN: October, 1992.

League for Innovation in the Community College, and Miami Dade Community College, Homestead Campus. *Distance Education Resource Guide*. Mission Viejo, CA: League for Innovation in the Community College, 1993.

Lee, Beth S., et al. "Limiting Access by Degrees: Student Profiles Pre and Post the Fees." Sacramento, CA: Los Rios Community College District, April 1993.

Lee, Eugene C. and Frank M. Bowen. *Managing Multicampus Systems*. San Francisco, CA: Jossey-Bass Publishers, 1975.

Lee, Eugene C. and Frank M. Bowen. *The Multicampus University*. New York: McGraw-Hill Book Company, 1971.

Legislative Analyst's Office. "The 1990-91 Budget: Perspectives and Issues". *Capital Outlay for Postsecondary Education*. Sacramento, CA: LAO, 1990.

Legislative Analyst's Office. *Analysis of California Postsecondary Education Commission Report "A Capacity for Learning: Revising Space and Utilization Standards for California Public Higher Education."* Sacramento, CA: LAO, May 21, 1990.

Levin, Henry M. "Raising Productivity in Higher Education." *Journal of Higher Education*, Vol. 62, No. 3. Ohio State University Press, May/June 1991.

Levin, Henry M. *The Educational Implications of High Technology*. Palo Alto, CA: Institute for Research on Educational Finance and Governance, 1983.

Lewis, Raymond J., Jr., et al. "New Technologies For Higher Education." *Current Issues in Higher Education*, No. 5, 1981.

Lin, Y., et al. *Teaching and Learning in the College Classroom: A Review of the Literature*, 2nd Edition. Michigan: University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning, 1986.

Linking for Learning: A New Course for Education. Washington DC: Office of Technology Assessment, 1989.

"Looking for a Quality Education?" *Quality Progress*, October 1991.

Los Rios Community College District, Office of Planning and Research. *Los Rios Community College District Long-Range Educational and Facilities Master Plan 1991-2001.* Sacramento, CA: Los Rios CCD, November 1991.

Los Rios Community College District, Office of Planning and Research. *In Touch with the Past, Shaping the Future: Los Rios and the Fourth College, A Proposal to Develop Folsom Lake Community College.* Sacramento, CA: Los Rios CCD, March 1992.

Lowenstein, Ronnie, and David E. Barbee. "The New Technology: Agent of Transformation." Submitted to U.S. Department of Labor, November 14, 1990.

"Managing for the Future: A Call for System Redesign." *Regents Review, S*pecial Edition. Columbus, OH: Ohio Board of Regents, August 1992.

Managing for the Future Task Force, *Managing for the Future: Challenges & Opportunities for Higher Education in Ohio.* July 1992.

Mann, Nancy R. *The Keys to Excellence: The Story of the Deming Philosophy (2nd Edition).* Los Angeles: Prestwick Books, 1987.

Marchese, Ted. "TQM Reaches the Academy." *American Association for Higher Education Bulletin,* Vol. 44, No. 3. Washington, D.C.: AAHE, November 1991.

Martorana, S.V., and William E. Piland, eds. *Designing Programs for Community Groups.* New Directions for Community Colleges, No. 45. San Francisco, CA: Jossey-Bass, March 1984.

Mayer, R., and C. Weinstein. "The Teaching of Learning Strategies." *Handbook of Research on Teaching*, M. Witrock (ed.), New York: Macmillan, 1986.

McGuinness, Aims C., Jr., and Christine Paulson. *State Postsecondary Education Structures Handbook: 1991.* Denver, CO: Education Commission of the States, 1990.

McLeod, Ramon G. "California Population Expected to Boom: It's Likely to Double in 50 Years, State Says." *San Francisco Chronicle,* April 14, 1993.

McLeod, Ramon G. "Record Number of Immigrants to California: Legal Arrivals Also Surged in Bay Area Last Year." *San Francisco Chronicle,* September 3, 1993.

MDC Inc. "Summary of Major Issues: Task Force on Funding." Chapel Hill, NC: MDC Inc., 1989.

Medsker, Leland L., and George W. Clark. *State Level Governance of California Junior Colleges*. Berkeley, CA: The Center for Research and Development in Higher Education, University of California, 1966.

Megarry, Jacquetta, et al. *Computers and Education*. New York: Nichols Publishing Company, 1982.

Mertes, David, Chancellor, Los Rios Community College District, On Behalf of the CCCT/CEO Task Force on Governance. Comments Regarding the Bowen/Glenny Report Presented to the Master Plan Review Commission on Community College Governance, December 17, 1986.

Messick, S. "The Nature of Cognitive Styles: Problem and Promises in Educational Practice." *Educational Psychologist,* Vol. 19, 1984.

MGT Consultants. *Study of Higher Education Space and Utilization Standards and Guidelines in the Fifty States*. Sacramento, CA: CPEC (90-4), January 1990.

MGT Consultants. *Study of Higher Education Space and Utilization Standards/Guidelines in California*. Sacramento, CA: CPEC (90-6), January 1990.

MGT Consultants. *Study to Provide Assistance in the Development of a Long-Range Master Plan for New Community College Campuses*. Sacramento, CA: MGT Consultants, September 10, 1990.

MGT Consultants. "Grossmont-Cuyamaca Community College District Strategic and Facilities Master Plan." San Diego, CA: MGT Consultants, March 1991.

MGT Consultants, Inc. *Survey of Space Utilization Standards and Guidelines in the Fifty States.* Sacramento, CA: CPEC (90-4), January 1990.

Miller, R. (ed.) *Applying the Deming Method to Higher Education for More Effective Human Resource Management*. Washington, D.C.: College and University Personnel Association, 1991.

Moore, Richard. Testimony to Oversight Hearing of the Assembly Committee on Higher Education--The Impact of Budget Restrictions on Access to Higher Education. October 20, 1992.

National Distance Learning Center. General Information Packet. Owensboro, KY: September, 1992.

National Education Association. "NEA Faculty Salary Report." *The NEA 1993 Almanac of Higher Education.* Washington, D.C.: NEA Publishing, 1993.

Needham, Robbie Lee. "Total Quality Management: An Overview." *Leadership Abstracts,* Vol. 4, No. 10. Mission Viejo, CA: League for Innovation in the Community College, July 1991.

Norris, Donald M., and Nick L. Poulton. *A Guide for New Planners.* Ann Arbor, MI: The Society for College and University Planning, 1991.

Nunamaker, J.F., et al. "Electronic Meeting Systems to Support Group Work." *Communications*

of the ACM, July 1991.

Nussbaum, Thomas J. *Too Much Law...Too Much Structure: Together We Can Cut the Gordian Knot*. Sacramento, CA: Community College League of California, 1992.

Ohio Board of Regents. *Securing the Future of Higher Education in Ohio.* December, 1992.

Oregon ED-NET. *Compass: Oregon's Information Navigation Tool for the 1990's.* Portland, OR: Oregon ED-NET, December 1993.

Orfield, Gary, and Faith G. Paul. "State Higher Education Systems and College Completion." Final Report to the Ford Foundation. November 1992.

Organisation for Economic Cooperation and Development. *Higher Education in California.* Paris, France: Organisation for Economic Cooperation and Development, 1990.

Osborne, David, and Ted Gaebler. *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector; From Schoolhouse to Statehouse, City Hall to the Pentagon.* Reading, MA: Addison Wesley Publishing, April 1992.

Owu, Michael. "Classrooms for the 21st Century: Why colleges must renovate their classrooms, and how it should be done." *Planning for Higher Education,* Vol. 20, Spring 1992.

Palmer, Jim. "Sources and Information: Instructional Technology at Community Colleges." *New Directions for Community Colleges*. George Voegel, ed. No. 55, Fall 1986.

Paul, Ross H. *Open Learning and Open Management*. New York: Nichols Publishing Company, 1990.

Pereleman, Lewis. "Schools: America's $500 Billion Flop." *Washington Post*, December 3, 1989.

Pohrte, Theodore. "Telecourses: Institutional Design for Nontraditional Students." *New Directions for Community Colleges*, No. 71, Fall 1990.

Postsecondary Education Planning Commission. *Joint-Use Facilities for Postsecondary Education in Florida.* Report 5. Tallahassee, FL: Postsecondary Education Planning Commission, March 21, 1985.

Postsecondary Education Planning Commission. *A Study of the Courses, Programs and Facilities at the Okaloosa-Walton Junior College/University of West Florida Joint Center in Fort Walton Beach.* Report 9. Tallahassee, FL: Postsecondary Education Planning Commission, September 10, 1987.

Postsecondary Education Planning Commission. *The Structure of Public Postsecondary Education in Florida.* Report 9. Tallahassee, FL: Postsecondary Education Planning Commission, April 19, 1990.

"Real Reform Should be Sought by the Innovation Commission." Editorial, *Newsletter for the Association of California Community College Administrators,* 1993.

Reilly, Kevin P., and Gulliver, Kate M. "Interstate Authorization of Distance Higher Education via Telecommunications: The Developing National Consensus in Policy and Practice."

The American Journal of Distance Education, Vol. 6, No. 2, 1992.

Richardson, Richard C., Jr. "Creating Effective Learning Environments." Tempe, AZ: College of Education, Arizona State University, October 27, 1992.

Richman, Louis S. "Software Catches the Team Spirit." *Fortune*, June 8, 1987.

Riel, Margaret. "The Impact of Computers in Classrooms." *Journal of Research on Computing in Education*, Winter 1989.

Rio Hondo College. "Serving Students Through Technology: New Paradigms for New Colleges." Whittier, CA: Rio Hondo College, January 1993, Draft.

Roberts, Nancy, et al. *Integrating Telecommunications into Education*. Englewood Cliffs, NJ: Prentice Hall, 1990.

Robinson, James D. "An Open Letter: TQM on the Campus." *Harvard Business Review*, November/December 1991.

Roblyer, M.D. "The Impact of Microcomputer-Based Instruction on Teaching and Learning: A Review of Recent Research." *Educational Technology*, February 1990.

Rocheleau, L., et al. "A Restructured Quality High School: The Continuous Improvement Process in Action." Sitka, AK: Mt. Edgecombe High School, 1990.

Rodda, Albert S. *Commentary on the History of California Community Colleges*. Los Rios Community College District, 1986.

Rodda, Albert S. "Community College Finance Reform and Funding Equalization: A Complex, Controversial and Significant Issue." Los Rios Community College District, February 1987.

Rodriguez, Raul G. "Total Quality Commitment in Higher Education: Improving Institutional Research." Yosemite Community College District, Inquiry Newsletter, May 1991.

Rothblatt, Sheldon. *The OECD, the Master Plan and the California Dream: A Berkeley Conversation*. Berkeley, CA: Center for Studies in Higher Education, University of California, Berkeley, 1992.

Roueche, Suanne D., ed. "The Instructional Skills Workshop. A Memorandum for Instructional and Organizational Renewal." *Innovation Abstracts*, Vol. IX, No. 10. Austin, TX: National Institute for Staff and Organizational Development, April 3, 1987.

Rounds, Jeanine C., Martha J. Kanter, and Marlene Blumin. "Technology and Testing: What is around the Corner?" *New Directions for Community Colleges*, No. 59, Fall 1987.

Rushby, Nick, and Anne Howe. *Educational, Training, and Information Technologies: Economics and Other Realities*. New York: Nichols Publishing Company, 1986.

Saffo, Paul. "Same Time, Same Place Groupware." *PC Magazine*, March 20, 1990.

Samuelson, Robert J. "The Value of College." *Newsweek*, August 31, 1992.

San Mateo County Community College District, Center for Instructional Communications Technology. "Preliminary Outline of a Concept Under Discussion: To Extend the

Mission of the District Through the Expanded Utilization of Current and Developing Communications Technologies." July 20, 1992.

Schargel, Franklin P. "Promoting Quality in Education." *Vocational Education Journal.* November/December 1991.

Scherkenbach, W. *The Deming Route to Quality and Productivity: Road Maps and Roadblocks.* Rockville, MD: Mercury Press/Fairchild Publications, 1986.

Schmeck, R. "Learning Styles of College Students." *Individual Differences in Cognition,* R.F. Dillon and R.R. Schmeck (eds.). New York: Academic Press, 1983.

Schratz, M. "Researching While Teaching: An Action Research Approach in Higher Education." *Studies in Higher Education,* Vol. 17, No. 1, 1992.

Scott, Jack. "General Recommendations/Facilities Process." Pasadena, CA: Pasadena City College, January 25, 1993.

"Securing the Future of Higher Education in Ohio: The Regents Act on Managing for the Future Task Force Recommendations." *Regents Review,* Special Edition. Columbus, OH: Ohio Board of Regents, January 1993.

Senge, Peter. *The Fifth Discipline.* New York: Doubleday, 1990.

Seymour, Daniel T. *On Q: Causing Quality in Higher Education.* New York: American Council on Education and Macmillan, 1992.

Seymour, Daniel, and Casey Collett. *Total Quality Management in Higher Education: A Critical Assessment.* Methuen, MA: GOAL/QPC, 1991.

Seymour, Daniel T. "TQM on Campus." *American Association for Higher Education Bulletin,* Vol. 44, No. 3. Washington, D.C.: AAHE, November 1991.

Shannon, Albert J. "Can the Academy Afford Total Quality Management." *Policy Perspectives,* September 1991.

Shavelson, Richard, and John D.Winkler. *Can Implementation of Computers Be Justified on Cost-effectiveness Grounds?* Santa Monica, CA: The Rand Corporation, 1982.

Shavelson, Richard, et al. *Evaluating Student Outcomes from Telecourse Instruction: A Feasibility Study.* Santa Monica, CA: The Rand Corporation, 1986.

Sherr, Lawrence A., and Deborah J. Teeter, eds. "Total Quality Management in Higher Education." *New Directions for Institutional Research,* No. 71. Jossey-Bass Inc., Fall 1991.

Shook, R.L. *Turnaround: The New Ford Motor Company.* Englewood Cliffs, NJ: Prentice-Hall, 1990.

Shymoniak, Leonard. "Characteristics of Credit and Noncredit Students Enrolled in Basic Skills Classes." *Research & Analysis Memo #93-16.* Sacramento, CA: California Community Colleges, Chancellor's Office, May 4, 1993.

Simpson, Richard H. *The Neglected Branch: California Community Colleges.* Sacramento,

CA: Senate Office of Research, 1984.

Slaughter, Sheila. *The Higher Learning and High Technology*. Albany, NY: State University of New York, 1990.

Smith, Joshua L. "Community College Education in the New Millennium." The Howard Bowen Lecture at the Claremont Graduate School of Education, November 19, 1985.

Smith, Joshua L. "The Will to Change." Segmental Response to the Master Plan Review Commission's Reassessment Study of the California Community Colleges, February 11, 1986.

Smith, Joshua L. "A Call to Reform." Board of Governor's Meeting, Sacramento, CA: April 24, 1986.

Spanbauer, S.J. *Quality First in Education...Why Not?* Appleton, WI: Fox Valley Technical College Foundation, 1987.

Spanbauer, S.J. *Quality First Process Model*. Appleton, WI: Fox Valley Technical College Foundation, 1988.

Spanbauer, S.J. *Measuring and Costing Quality in Education: Using Quality and Productivity Methods to Improve Schools*. Appleton, WI: Fox Valley Technical College Foundation, 1989.

Spanbauer, S.J. *A Quality System for Education*. Milwaukee, WI: ASQC Quality Press, 1992.

State of Colorado, Office of State Auditor. "Report of the State Auditor." Denver, CO: October 1991.

The Statewide Evaluation of Matriculation: Final Report. Los Angeles, CA: Evaluation and Training Institute, February 1991.

Stetson, Nancy E. "Professional Development for Two-Way Teaching and Learning," *Leadership Abstracts*, Vol. 6, No. 7. Mission Viejo, CA: League for Innovation in the Community College, July 1993.

Strategic Planning Associates. *California Community College Accountability: State and Local Implementation Costs*. Sacramento, CA: California Community Colleges, Office of the Chancellor, 1991.

"Summary of Major Issues." Chapel Hill, NC: MDC Inc., Task Force on Funding, 1989.

Suslow, Sidney and Michael Riley. *Year-Round Operation at Berkeley: Background and Implementation*. Berkeley, CA: University of California, October 1968.

Tanner, C. Kenneth, and Thomas C. Holmes. *Microcomputer Applications in Educational Planning and Decision Making*. New York: Teachers College Press, 1985.

Task Force on Control and Coordination of the California Community Colleges. *Problems and Perceptions on Control and Coordination*. A Report to the Board of Directors of the California Junior College Association, 1973.

Teachers' Perspective. Santa Monica, CA: The Rand Corporation, 1984.

Technologists. Washington, D.C.: Office of Technology Assessment, 1988.

Texas Higher Education Coordinating Board. "Proposed Performance-Based Funding Process for Texas General Academic Institutions." Texas: Texas Public Community/Junior Colleges and Lamar-Orange and Port Arthur, Texas State Technical College System Institutions, October 12, 1992.

Thor, Linda. "Point of View." *Visions*. Maricopa Community College District, Spring 1993.

Thrust, October 1989.

Townsend, P.L. *Commit to Quality*. New York: Wiley, 1990.

Trombley, William H. "Public Policy by Anecdote: The Case of Community College Fees." Sacramento, CA: The California Higher Education Policy Center, April 1993.

Trott, A.J. *New Directions in Education and Training Technology*. New York: Nichols Publishing Company, 1985.

The Twentieth Century Fund Task Force on School Governance. *Facing the Challenge*. New York: The Twentieth Century Fund Press, 1992.

U.S. Telecommunications in a Global Economy, U.S. Department of Commerce, 1990.

Uhl, Norman P., ed. *Using Research for Strategic Planning*. New Directions for Higher Education, No. 37. San Francisco, CA: Jossey-Bass, March 1983.

Useem, Elizabeth L. *Low-Tech Education in a High-Tech World*. New York: Free Press, 1986.

Verduin, John R., Jr., and Thomas A. Clark. *Distance Education: The Foundations of Effective Practice*. San Francisco, CA: Jossey-Bass Publishers, 1991.

Voegel, George H., ed. *Advances in Instructional Technology*. San Francisco, CA: Jossey-Bass, 1986.

Walton, M. *The Deming Management Method*. New York: Putnam, 1986.

Walton, M. *Deming Management at Work*. New York: Putnam, 1990.

Western Association of Schools and Colleges, Accrediting Commission for Community & Junior Colleges. "Guide To Institutional Self Study & Reports To The Commission." 1990 Edition. Aptos, CA: Western Association of Schools and Colleges, 1990.

White, Mary Alice. *What Curriculum for the Information Age*? Hillsdale, NJ: ????

Winkler, John, et al. *How Effective Teachers Use Microcomputers for Instruction*. Santa Monica, CA: The Rand Corporation, 1984.

Winkler, John and Cathleen Stasz. *A Survey of Incentives for Staff Development of Computer-Based Instruction*. Santa Monica, CA: The Rand Corporation, 1985.

Winkler, John, and J. Michael Polich. *Effectiveness of Interactive Videodisc in Army Communications Training*. November 1990.

The Wisconsin Foundation For Vocational, Technical & Adult Education, Inc. "Report on The Wisconsin Foundation for Vocational, Technical and Adult Education, Inc." Middleton,

WI: November 18, 1992.

Wiseman, Robert. Faculty, Chabot College. Draft materials on year-round operation. 1992.

Yosemite Community College District. *Vision 2000: Creating Our Future.* Modesto, CA: YCCD, December 1991.

Ziegler, T. "Learning Technology with the Interactive Videodisc." *Journal of Studies in Technology Careers*, 1986.